



FRIDAY, JUNE 13.

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Contributions.

Cabinet Making and other Car Work.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Inasmuch as the presidential nominations for 1872 are not yet made, it is somewhat premature to begin the cabinet-making now. In view, however, of the correspondence which was published in your columns last week, the conclusion is irresistible that the diplomatic qualifications for the office of Secretary of State are possessed by Mr. William Get There McConway.

Spring Rail Frogs.

WOODBURY, Ga., May 30, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read with interest what has been said recently in your journal as to the danger of spring rail frogs. When I took charge of maintenance of way on a Tennessee railroad I found several spring rail frogs in use and they were a constant source of danger. Our cars were loaded heavily with coal, and some cars running over the track had a gauge wider than our standard. In these cases the flanges in one direction would bear against and force aside the spring rail, and the result would be a derailment. At one place five derailments occurred within six months. I had the track surfaced and leveled up carefully, but another smash-up occurred at the same switch. After a good deal of study watching the cars going over the spring frog I concluded that the trouble lay with that device and had it taken out. No more accidents occurred there while I was on the road, nor have I heard of any since.

The Rack Rail on the New Orleans Bridge.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In Mr. T. C. Clarke's discussion of the proposed bridge over the Mississippi at New Orleans, as given in your issue of May 16, appears the following:

"A consolidation engine, weighing with loaded tender 75 tons, can draw in addition to itself 2,675 tons on a level. As the resistance of gravity is directly as the grade, it could draw on a 7 per cent. grade one-seventh, or 382 tons, if it only had adhesion enough; but as a matter of fact it can only draw 74 tons. But if we give it adhesion by the Abt rack-rail system, it can draw 382 tons."

This discloses some curious mathematics and indicates a marked advance in engineering. I have no fault to find with the results, only with the process of reaching them.

[The statement that a locomotive weighing 75 tons which can haul a trainload of 2,675 tons on a level can haul but 74 tons on a 7 per cent. grade is pretty nearly accurate. More exact figures would be 73.63. The radical error lies in assuming that the power of the same engine would be increased by the use of a rack rail. In fact, to haul 74 tons on a 7 per cent. grade would require exactly as much pressure on the pistons and develop the same turning moment on the axles as to haul 2,675 tons on a level. Of course, with an engine of given cylinder power the hauling capacity is not increased by the use of a rack rail. The power of the locomotive remains the same whatever means are used to get adhesion. The rack rail simply makes it possible to use a greater cylinder power with a given weight of locomotive.—EDITOR RAILROAD GAZETTE.]

The Efficiency of Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you kindly allow me to call attention to a couple of points which seem to me to call for some comment?

In your criticism of my paper on "The Efficiency of Locomotives," presented at the late meeting of the Mechanical Engineers, you say, page 362: "It was also said 'the reduction of indicator card area, caused by early exhaust closure, and the large clearance spaces found in locomotive cylinders is often overestimated.' Then followed an estimate showing that the mean effective pressure is greater when the clearance is reduced, the compression being raised to the same point in each case, thus showing an advantage in favor of a reduced clearance, in increasing the power of the locomotive, as well as its theoretical economy." The italics are mine. Permit me to say that nowhere in my paper is there an estimate showing anything of the kind. On the contrary, the estimate you evidently (from the context) refer to shows exactly the reverse, the figures standing thus:

M. E. P. 10 per cent. diagram, 94.6 lbs.

M. E. P. 2 per cent. diagram, 91.8 lbs.

As, in the report of the paper in your news columns, these figures are correctly stated, there is indisputable evidence of careless reading on your part, and in consequence that portion of the criticism dealing with the matter of clearance is quite worthless.

Further on you say: "A most desirable condition of steam engine operation would be one in which no heat was extracted from the steam during compression, which condition is stated by the writer to exist, as noticeable in the foregoing quotation, when the compression takes place suddenly." The foregoing quotation is, "If compression takes place suddenly, as is the case in cylinders having very small clearances, the heat does not have time to become equalized between the steam and the cylinder wall, and the power required for compression will be in excess of that necessary where the action takes place more gradually."

I am unable to find anything in my paragraph to warrant the assertion you put in my mouth.

The point raised is that when compression takes place suddenly the line representing it approximates more nearly to the adiabatic than the isothermal curve.

W. F. DIXON.

Testing Locomotives.

CHAMPAIGN, ILL., June 3, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Replying to your letter of May 16, I submit the following outline of methods of testing locomotives:

In order to obtain results which are strictly comparable in tests of any sort, it is necessary that the conditions of all tests should be the same. It is obviously impossible to secure exactly the same conditions for two tests of locomotives in actual work, and, therefore, if comparisons are to be made which cannot be challenged, the locomotives must be taken off the road and tested in a testing shop. This has been done by Mr. Alexander Borodin, of Kief, Russia, and the report of his tests to determine the value of steam jackets and compounding will be found in *Engineering* for September, 1886. The locomotives can be set up in the shops, connected to work against a resistance which can be accurately measured, and the quantities of coal and water used and the quality of the steam furnished by the boiler can be as accurately determined as in stationary engine tests. Further, the engine and boiler can be separately tested. The engine may be supplied with steam from another boiler, or the steam for the blast may be furnished by a second boiler, and the exact losses in the cylinders can then be determined by condensing and collecting the exhaust steam.

The above appears to be the only exact method of making locomotive tests, and it is certainly the only method by which the effect of slight changes in the proportions of valves, nozzles, heating surface, etc., can be determined with any approach to accuracy. There are of course difficulties in the way of establishing and maintaining such testing plants. But thoroughly equipped joint testing stations could be established at large railroad centres without much expense to the contributing roads, and under the management of competent men these stations would be paying investments. Every new engine and those which have been undergoing repairs to valve gear and cylinders should be sent to the testing station for a few days for adjustment and test.

Turning now to tests on the road, it is clear that it is practically impossible to make two trials under exactly the same conditions. Everything is variable, weather, wind, speed, weight of train, journal and flange friction, etc., etc. It is doubtless true, however, that it is perfectly possible to make the conditions of tests much more nearly uniform than they are generally. The usual method of testing locomotives by taking indicator cards and keeping a record of fuel and water consumption on trips with regular trains making frequent stops is very unsatisfactory. By exercising great care in the measurement of coal and water, using coal from the same lot, selecting trains which do not vary much in weight, and a time of year when the weather conditions are reasonably uniform, eliminating the personal equation as far as possible by changing engine crews and extending the trials over a considerable period, a tolerably correct idea of the comparative efficiency of two or more locomotives for this particular work can be obtained, but nothing more. Calculations of water and coal per horse power hour or per unit of train weight are of very little if any value for comparison with tests made at other times and

places. It would seem, however, that tests could be made more nearly comparable by the general adoption of some system of testing, and the following method is suggested:

1. Establish testing tracks in different parts of the country, which should be free from heavy grades and curves, at least 100 miles long, and as nearly alike as possible.

2. Send all locomotives to be tested to one of these testing tracks.

3. Select trains for testing purposes which do not make many stops, such as express freight trains.

4. Make at least three round trips with each engine and with different engine crews.

5. Selected coal from specified mines, bituminous and anthracite, to be used in all tests.

6. Fires to be started with weighed wood and coal, with water in the boiler at a specified temperature. All fuel used to be charged to the test, the fire to be burned low at the end of the run and the amount of coke remaining in the fire to be estimated.

7. Coal to be weighed into tender and the remainder at end of test to be weighed out.

8. Height of water in glass gauge to be recorded with engine standing as soon as working pressure is reached and at end of test when fire is dropped, the difference to be allowed for in total water used.

9. Water used to be measured by glass gauges on tank when standing, one gauge near each front corner of tank and one in middle of back end. The weight of water per inch of height to be determined by weighing.

10. The temperature of the water in the tank to be determined by an accurate thermometer sufficiently often to insure a correct average.

11. The quality of the steam entering the cylinders to be determined by means of a Barrus "universal" calorimeter.

12. Indicator cards to be taken from both cylinders at intervals not greater than every two and a half minutes during the whole time that the throttle is open. For ordinary locomotives, not compound, the equality of the distribution in the two cylinders can be determined by a preliminary test, after which cards from one cylinder will be sufficient. The revolutions to be recorded by a revolution counter, noted as accurately as possible for each pair of indicator cards, and also the total for each period of working with steam, as a check. The gauge pressure and positions of reverse lever and throttle to be recorded at time of taking each pair of diagrams.

13. The coal and water per indicated horse power per hour to be calculated from the general average of all indicator cards taken as above and from the total actual consumption.

The above is an outline of a method of standardizing tests. There are, doubtless, many points in which it could be improved, and it is submitted with the hope of bringing out opinions on these details. There are also many details as to forms for recording data, attaching indicators, indicator motions, etc., which should be standardized by agreement among the men interested in locomotive tests. It is to be hoped that the committee of the American Society of Mechanical Engineers recently appointed will do much toward establishing such standards.

ARTHUR T. WOODS.

The Roadmasters' Association and Rail Joints.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The most inconsistent and widely circulated error that went the rounds of the press in regard to the proceedings of the Roadmasters' Convention last fall was the statement that "the convention favored the long angle bar, and what is known as the suspended joint." The fact is that at the close of a long and spirited debate on standard track joints, about three-fourths of the 90 odd members present voted for a resolution, which said in effect "that angle bars of sufficient length, 36 to 48 in. long, extending across three ties, with middle tie under ends of rails, makes the best joint now known." Of course this means a supported joint.

Much of the opposition to the three-tie angle bar appeared to have been instigated by a certain influential member, who was interested in marketing a channel plate designed for use under the ordinary short angle bar and suspended joint. Prompted by respect for this gentleman, the convention permitted him to take up a great deal of its time in discussing and advocating his plate, and also allowed him to place the plate on exhibition in the hall, contrary to a rule prohibiting supply men from exhibiting their devices in this manner while the convention was in session. All of this was tolerated with the utmost good nature, although very few of the members could see sufficient merit in the device to warrant the expenditure of \$368 per mile in applying it to track, when most of them believed that joints could be better and more cheaply supported by using the three-tie angle bars.

It was easy to tolerate the mistakes of the reporters and the undue privileges accorded the channel plate and its backers at the convention. But when we find the official report of that convention apparently perverted, the remarks of members who opposed the plate and suspended joint rendered contradictory and absurd, or misquoted in a manner that makes them say in the report the reverse of what they actually said in the convention; and, furthermore, when we find this plate and suspended

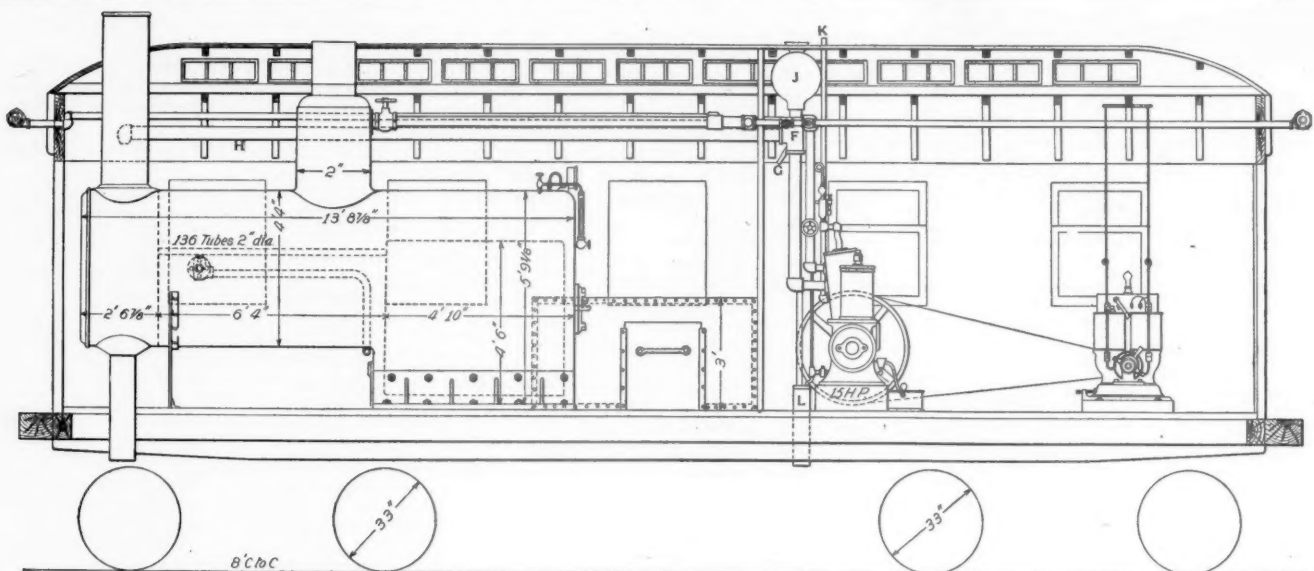


Fig. 1. Section Showing Right Side.

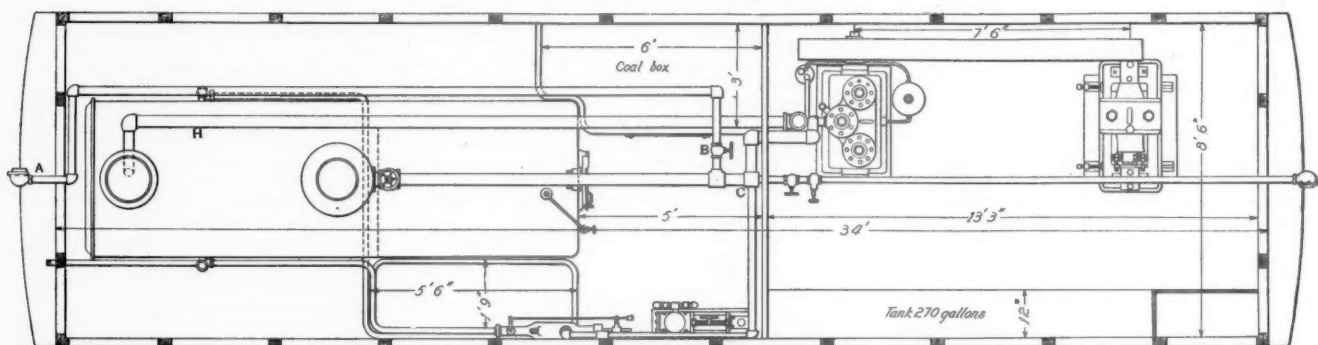


Fig. 2. Floor Plan.

LIGHT AND HEAT TENDER—CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

joint shown up more conspicuously than any other subject in the report, and so arranged as to lead the reader to infer at first glance that this was the device indorsed by the convention, how can we avoid believing that the report has been glaringly colored to favor this plate and the suspended joint?

My own remarks on "Standard Track Joints" were substantially as follows: "I am an advocate of the long angle bar and supported joint, but I see no necessity for a plate extending across three ties under this joint. It has occurred to me in thinking this matter over before now that a very efficient arrangement could be had by permitting the ends of rails to rest on a light plate of metal something like the Serviss tie plate, on the tie centered under the joint, as this would help to prevent the heads of rails from being driven downward between the upper edges of splices at the middle. I think such a plate would be useful on soft ties, but not necessary on hard ones. I have noticed on track with suspended joints that in the course of time the ends of rails are driven downward between the splices, and I have seen the upper edge of plates on a long line of road cut down the eighth of an inch or more at and near the middle, thus producing lost motion and a vertical play of rail ends that could not be taken up by the bolts. I do not believe in the suspended joint. I believe in having a firm support under the end of the rail as with the three tie joint, but I do not consider a plate absolutely necessary even on the centre tie of this joint."

Replying to the questions of several gentlemen relative to the road, weight of rail, and kind of angle bars referred to, I stated that "I had seen much of this trouble on the Rio Grande road with Samson bar angle plates where the track was well cared for, and the fact of the rails and plates being of a light pattern only served to produce quick results in demonstrating the bad features of the suspended joint. I believe in placing the end of rail squarely on its feet on top of a solid joint tie, and thus remove the stress from upper edge of angle bars instead of "hanging it up by the ears," so to speak, on the beveled edges of plates where the head would act as a wedge in straining and grinding them and in loosening or breaking the bolts."

These were my views, and I believe very nearly the exact words in which they were expressed at the convention. A comparison of the above with what I am credited with saying, on page 93 and 94 of the report, will show how shamefully I am misquoted, and will also fairly illustrate the manner in which the remarks of several others, who opposed the channel plate and suspended joint, have been garbled and rendered ridiculous. It would hardly seem fair to attribute all of this to mistakes of the stenographer, considering that his reports on all other subjects are comparatively consistent and correct. But if unfamiliarity with track arrangements and terms had led him to err, it was the duty of our com-

mittee on publication to correct all palpable blunders and inconsistencies that could be seen at a glance and properly corrected by an ordinary section man, and thus put the report in a shape that would not reflect disgracefully on certain members, and through them on the whole Association. If the committee found errors that they could not reduce to a common sense version, they should have referred the obscure passages to members who were being misquoted and let them make the necessary corrections. There was ample time for this, as the committee has taken nearly eight months to bring out the report.

The people who granted us leave of absence and free transportation to enable us to attend this convention and discuss matters that they were interested in are certainly entitled to a correct report of our discussions and conclusions. The same is due to several hundred members of the Association who were unable to attend on this occasion, and now, after waiting eight months for an official report, we find it botched or doctored to an extent that exposes many of us to ridicule and the whole Association to discredit. If our Association is to survive and maintain a respectable position in railroad circles, or if its suggestions are to have any weight in prompting our general officers to let us adopt in our department the methods and appliances formerly recommended at our meetings, then the proceedings of such meetings must be honestly and correctly reported, regardless of injury to pet schemes of people within or outside the Association.

D. SWEENEY,

Chicago, Kansas & Nebraska.

[If Mr. Sweeney will look at the *Railroad Gazette's* report, pp. 612 and 626, September, 1889, he will see that we, at least, were not misled as to the action of the Association. We reported (p. 626) the adoption of a resolution in favor of a three-tie joint supported, and also that the report of the committee of 1889 was not adopted.—EDITOR RAILROAD GAZETTE.]

Light and heat Tender—Chicago, Milwaukee & St. Paul Railway.

What follows is a description of one of the most interesting and successful of the recent plans for lighting trains by electricity and heating them by steam. In this case the problem presented was to supply a system of heating and of lighting that should contain no element of danger for the passenger in the event of a serious wreck, and yet be practicable in a train from 10 to 14 cars running over lines built through a country noted for its cold waves and long continued range of low temperature at periods during seven months of the year.

Mr. George W. Gibbs, the mechanical engineer of the

Chicago, Milwaukee and St. Paul Railway Co., solved the problem for that road by constructing an independent "light and heat tender"; in other words, a central light, heat and power station on wheels, views of which are shown herewith.

The Tender Car.—This special car follows immediately behind the locomotive tender, is 34 ft. long by 9 ft. in width, encased in $\frac{1}{4}$ -in. plate steel, with steel doors, and supported on a heavy under-frame of unusual strength resting on special trucks. Including full equipment, its total weight is 65,000 lbs. It is carried on four-wheeled trucks having 33-in. wheels, and the new Master Car Builders' Standard axle with journals $4\frac{1}{4}$ in. \times 8 in. The interior of this tender is divided into two compartments, separated from each other by steel doors, the larger or forward section being 20 ft. in length and holding a tubular steel boiler, to carry 125 lbs. of steam, though but 80 lbs. pressure have thus far been used. This boiler is 13 ft. 9 in. in length, with 136 two-inch tubes. The furnace is of the locomotive type, with safety lock on the door, the fire box being 4 ft. 10 in. long and carrying but a thin bed of coals, the ashes being raked down to the roadbed. On each side of the furnace is placed a coal box, the two combined carrying an amount of fuel nearly sufficient for the round trip in midwinter, thus allowing for any delay not exceeding ten hours. The floor of this section is of iron.

The rear section of this tender contains a No. 4 Edison compound-wound dynamo, belted direct to a standard $6\frac{1}{2} \times 6$ in. Westinghouse engine, the distance between the centres of shafting being 7 ft. 6 in. The necessary switches, resistance boxes, Weston voltmeter and ammeter, etc., are the same as in a regular station. The weight of engine and dynamo is counterbalanced by a steel tank placed on the opposite side of the section, and holding 270 gallons of water in reserve for use in the event of an accident or the absence of the locomotive tender, from which the water required in the boiler is constantly pumped.

In fig. 1 and fig. 2 are shown the engine, boiler and dynamo. The boiler has a water bottom; that is, it is double, with water between the sheets as a precaution against fire. It is in one end of the car, and a straight smoke-stack extends through the roof. From a 24-in. dome on top of the boiler a steam pipe goes to the engine and to both ends of the car to coupling joints for heating the train. A better understanding of the location of the injector, pump, water tank and electric switches is got from fig. 3. Figs. 4 and 5 show the location and arrangement of the engine and piping, also of the boiler and the coal bunkers. The fire door has a safety catch, and the boiler, having a water bottom, the fire is held in a fireproof receptacle. The amount of fire at any time is very small, the draft being only a natural draft and the fire very thin; little or no smoke issues

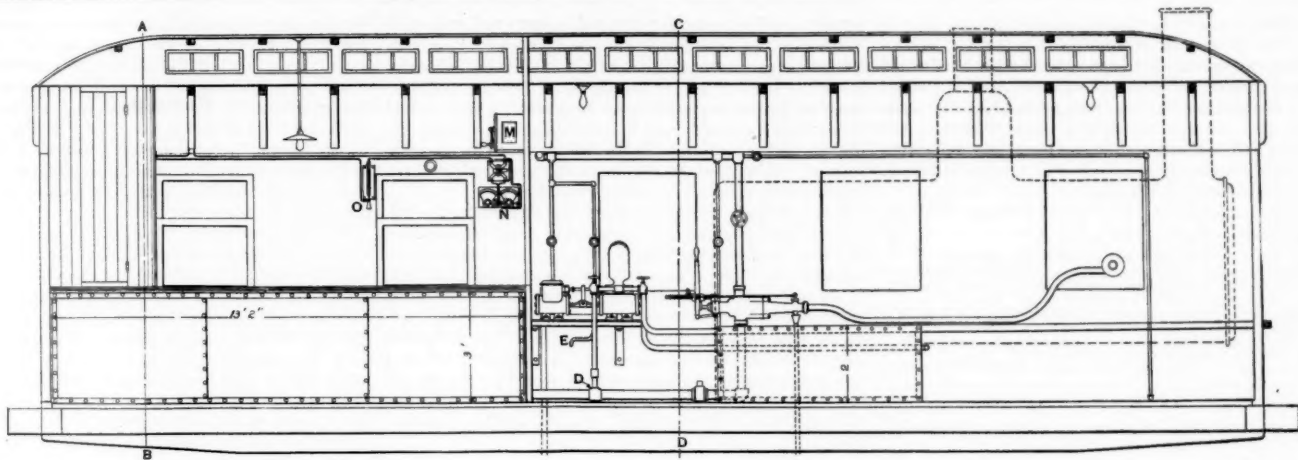


Fig. 3.—Section Showing Left Side.

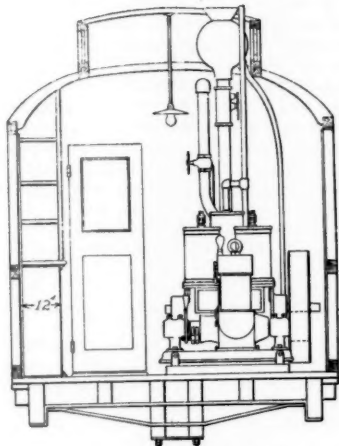


Fig. 4.—Section A B.

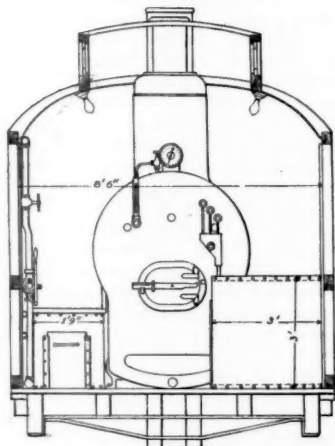


Fig. 5.—Section C D.

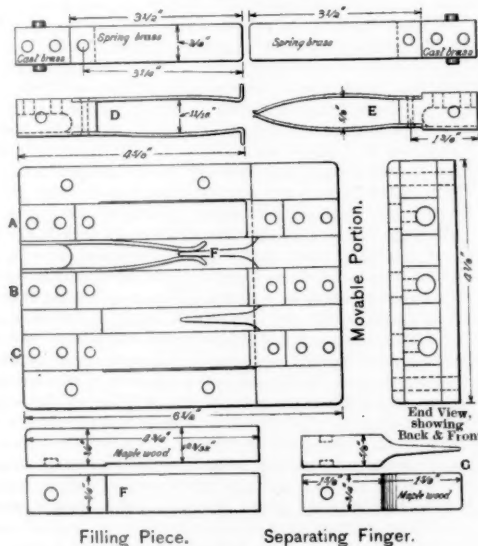


Fig. 7.

from the stack. The car is ventilated through the deck sash and lighted by electric lights. The location of the variable field resistance at *N* and the switches at *N* and *O* are clearly indicated in fig. 3.

Piping.—The steam pipe from the locomotive enters at the end of the car, as shown on the plan, fig. 2, at *A*, and passes back to a stop valve at *B*. When it is desirable to re-

verse the car or to use steam from the engine, the stop valve *B* is opened. The steam pipe from the small boiler leads back from a throttle valve shown to a cross at *C*, from which pipes lead to the Westinghouse engine, to a stop valve and reducing valve, thence to the train heating system, and to the steam pump and injector, as shown. Both the pump and the injector are piped to draw water from the tank in the heat and light tender or from the locomotive tender, and to deliver it to the boiler; the injector delivering on the left-hand check, the pump into the right-hand check. This feeding apparatus is also arranged to take water from the engine tender and to deliver it into the tank of the heat and light tender. From the steam pipe a heater pipe is run into the water pipe connecting with the tank to prevent freezing, as shown in fig. 3 at *D*. In fig. 3 is seen a drip pipe at *E*, which also serves as a faucet from which to get hot water for washing, etc.

The location of the injector, the pump and their connections is shown in the same figure. Returning to the plan, fig. 2, and the elevation, fig. 1, it will be noticed that the exhaust from the engine passes vertically to a *T* at *F*, in which is a flap valve with a handle, shown at *G*, which can be adjusted to send steam through the horizontal pipe *H* to the smokestack, to blow the fires; however, in ordinary operation the natural draft is quite sufficient. The remainder of the exhaust steam passes upward through the muffler *J*, just under the roof of the car. The pipe *K* at this point is the vapor pipe from the Westinghouse engine, valve and crank chamber.

The drip from the engine and the piping passes into a short section of 4-in. pipe at *L*, which goes through the bottom of the car. This, being of large diameter, will not be clogged by freezing, as the case would be in a small terminal drip pipe in extremely cold weather. Into this terminal drip a small steam pipe passes, for thawing out in case of necessity.

Wiring.—The wiring of a car is an extremely simple matter, and the work is done by apprentices at the St. Paul shops under the direction of Mr. Gibbs, who has had considerable experience with electrical details in the shops of the Edison Electric Co.

In fig. 6 are shown the plan of wiring and the location

of the lights. The wires are laid on top of the roof, as shown at *P*. From this point they lead to the switches and the lamp, as indicated by the dotted line. The arrangement of the switches is such that the lavatory and vestibule lights, the berth lamps and the overhead lamps are independent, any or all of which can be cut out when desirable.

From the switchboard in the tender the main circuits of No. 0 okonite wire are carried along under the roof of the cars in four lengths; No. 1, the positive wire of lamp circuit being placed on left-hand side; No. 2, the through wire of loop; No. 3, the negative lamp circuit wire and return of loop, No. 4 being held in reserve for special purposes. From No. 1 and No. 3 run 15 ft. of No. 4 insulated wire to switch box, and from thence 240 ft. of No. 9 wire carry the current to the fixture or lamp circuits composed of 210 ft. of No. 16 insulated wire and 25 ft. of flexible duplex cord. The lamps on these circuits are arranged one on each side of the ten chandeliers in the centre of car; then there is a lamp above each outer entrance to car and in each passageway, as well as in the toilet rooms, making a total of 27 lamps. An independent circuit leading from switchboard, of 140 ft. of No. 12 wire, carries the current for the six Gibbs berth lamps. These berth lamps were illustrated in the *Railroad Gazette* Feb. 7, the lamp being placed within a drum having two rotating shutters, which can be raised or lowered when desired to use or to shut out the light. The hood formed by the upper half of the drum is so arranged that it shades the light from the eyes of the passengers who are facing it, and it also serves as a reflector to cast light upon the book or paper in the hands of the passengers sitting under it. As the shutters open on both sides, one lamp does for two berths, and the closing of the second shutter, when the occupant is through using the lamp, cuts it out of circuit. Should occasion arise during the night to use the lamp, the simple opening of either shutter cuts the lamp in circuit.

In fig. 7 is shown the electric train connection between cars. It consists of three parts, *A*, *B*, *C*, which form connections for the three lines of wire. This device consists of brass springs, riveted and soldered to brass blocks, as shown at *D* and *E*. These in turn are secured to blocks of maple wood, shown at *F*. This connection

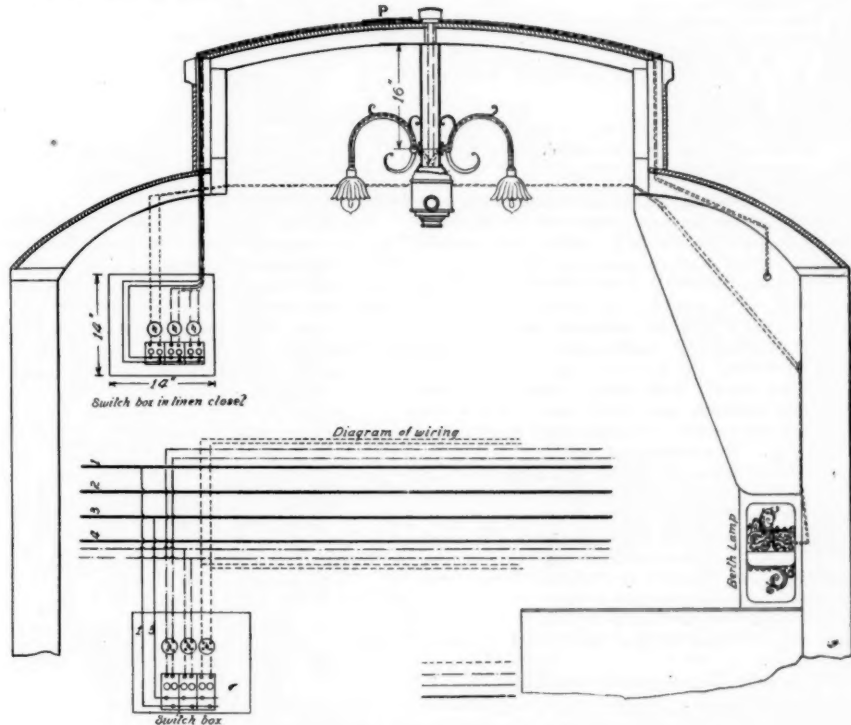


Fig. 6.—Cross-Section, Showing Wiring.

LIGHT AND HEAT TENDER—CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

is reversible, and can be coupled either side up. One of the novelties in it is the automatic closing switch, shown at F. The two springs are kept apart by the hard wood separating finger shown in details at G, and when the coupling is disconnected the springs come together automatically and complete the circuit. It is therefore not necessary to close the switch or perform any operation to complete the electric circuit when a car is disconnected from the rear of a train.

The following bill of material is necessary to complete the wiring of one car:

210 ft. of No. 0 main wire in three lengths, as follows:
One length positive wire of lamp circuit, placed on left hand looking out of car; 1 length through wire of loop; 1 length negative lamp circuit wire. Return of loop.
15 ft. main wires for car circuits to cut-out box, No. 4 gauge.
240 ft. lamp circuits from switch box, No. 9 gauge.
210 ft. wires from circuit wires to fixtures, No. 16 gauge.
140 ft. berth light circuits, No. 12 gauge.
25 ft. fixture wiring, No. 16 flexible cord.
6 Gibbs berth lights.
20 chandelier brackets, Bergmann & Co., catalogue No. 338, with key.
Sockets, polished brass, or silver, to match centre lamps, with clamps.
1 bracket, No. 338, with wall plate, polished brass, with key socket.
6 tall plate sockets, with key, No. 8, polished brass or silver.
24 shades, opalescent.
6 keyless receptacle, No. 3 plain.
6 push button switches, No. 209 plain.
Switch box, 14 x 14 x 4 in.
3 cut-outs, No. 1,935, Bergmann & Co.
6 plugs, No. 181, Bergmann & Co., 2 6-light, 4 15-light.
3 double pole switches, Bergmann & Co., No. 511, 1 10 and 2 15-light, plain finish.
75 ft. molding, four wire, No. 0.
150 ft. molding, two wire, No. 9.
12 ft. molding, two wire, No. 16.
40 ft. molding, two wire, No. 12 special, inside of upper berths.
Above molding to include capping.

Summer Arrangement.—During the summer, when it is not necessary to heat the trains, a decrease in train load—a small one, however—is obtained by putting the dynamo and engines in the end of a baggage car, where it occupies about 12 ft.; that is, in a 60-ft. baggage car 12 ft. of one end is given over to the engine and dynamo. This leaves a 4-ft. baggage space for baggage, which has so far been sufficient. A steam pipe from the engine is brought in through the end of the car, on the inside of which there is a tee, from which a pipe leads across under the roof of the car and down into a steam separator, where the water of condensation is extracted from the steam. This separator is made of a piece of large pipe with heads on each end. The pipe from the tender enters the bottom and the steam pipe of the engine leads out from the top. After passing the tee on the train pipe, a reducing valve decreases the steam pressure from that necessary for the engine to that desirable for the train. The exhaust from the engine passes up through the roof and through a muffler. This is a very compact arrangement, occupying but little room and offering no obstruction to the passage of trainmen through the car.

The arrangement of the apparatus is quite like that in the heat and light tender. The car carries a No. 4 Edison dynamo, compound wound, and a 6½ in. x 6 in. Westinghouse automatic engine. So much attention has been paid to the balancing of the engine, the dynamo and the location of the same that the train is not shaken or disagreeably jarred when the machinery is in motion, and it is not necessary to stop the engine when the train is stopped in order to prevent the jarring, as the case is on some trains.

Operation.—These tenders are running in daily service between Chicago and Minneapolis. Four men are employed, each man making a round trip of 800 miles from Chicago to Minneapolis and return, with a short rest at Minneapolis and 36 hours rest at Chicago. Only one man is employed on a train at one time, and it is an easy matter for him to care for the entire heating and lighting of the train. Only one electrician is employed for all the trains.

When the train is being made up in the yards steam is got under way in the tender, and the Westinghouse engine and Edison dynamo started, the lamps being turned on as required till 11 p. m., when all are turned out save those on the end circuits in the vestibules, toilet rooms and passage ways, and about 6 a. m. the necessary lights are turned on again, but the dynamo is continually in operation during the entire night.

In the two years of extensive experiment which the company has made with electric lighting much experience has been gained with storage batteries. They were found costly and unreliable. The depreciation of batteries and waste of power were found to be very great under heavy working loads. They gave constant trouble from freezing in the winter, shaking to pieces, buckling of plates, short circuiting and other operating failures. In short, the storage battery system required too much skillful attention to be a practicable method of electric train lighting.

The boiler shown in the illustration has sufficient capacity to heat 10 cars and furnish the steam for driving the dynamos. With Western coal this boiler will evaporate about 6 lbs. of water per lb. of coal. The first engines used were of the Brotherhood type, but as soon as a scientific test was made they were discarded, it being found that it required 105 lbs. of water per horse power to drive them. With the Westinghouse engine better results were got with 57.8 lbs. of water per horse power with an average indicated horse power 10.4; this is for a 15 horse power automatic engine with 80-lb. steam pressure.

The Brotherhood engine, besides being wasteful of

power, required constant renewal of parts and was liable to break down frequently when subjected to long continuous runs. Moreover, it was not of sufficient capacity to supply the full load of 154 lights. This necessitated drawing on the batteries to an undesirable extent, and these were frequently not in a condition to supply the train. In the estimates in the tables herewith, the commercial efficiency of the dynamos, it is assumed, is 85 per cent., which is rather an under estimate.

In a test of a Brotherhood engine in baggage car No. 195, a three-hour run was made supplying steam from boiler in tender car. Engine was run with good average working load, the current generated being charged into batteries and five-minute readings taken from electrical instruments. From these figures the electrical and mechanical H. P. were calculated and finally the indicated horse power by adding an assumed figure for friction; this was taken as the same as that found for the Westinghouse engine, which may possibly err in being too favorable to the Brotherhood. These results are as follows:

Time of test.....	3 hours.
Coal used.....	470 lbs.
Coal used per hour.....	157 "
Water used.....	2,681 "
Water used per hour.....	894 "
Evaporated per pound of coal.....	5.7 "
Average electrical load.....	4,516 watts.
" mechanical H. P.....	6.03
" indicated H. P.....	6.96
Coal per indicated H. P. hour.....	184 lbs.
Water per indicated H. P. hour.....	105 lbs.

Note.—"Indicated H. P." is "Mechanical H. P." plus friction of engine and dynamo. "Mechanical H. P." is derived from electrical measurements and means total rate of work done on electrical circuits. "Electrical H. P." is rate of work appearing in lamp circuit.

In the tables are given in detail the indicator tests of the Westinghouse engine under all conditions of load from heaviest to running light. The second portion of table shows results figured on electrical instruments, from which it will be seen that the power, as measured by indicator cards and by the other method, almost exactly checks.

INDICATOR TEST, ENGINE NO. 2—MARCH 31, 1890.

Card No.	Ind. H. P.	Mech. H. P.	Differ. ences.	Diff. allowing for friction.	Lamps burning.	Lamps per ind. H. P.	Lamps per mech. H. P.
5.....	11.6	9.15	2.45	+ .05	142	12.2	15.5
6.....	10.16	8.16	2.00	— .4	122	12.0	14.9
8.....	9.43	7.63	1.8	— .8	112	11.8	14.6
11.....	7.43	5.53	1.9	— .5	78	10.5	14.1
13.....	5.5	3.1	2.5	+ .1	34	6.1	11.0
15.....	4.44	1.84	2.6	+ .2	26	5.9	14.1
17.....	11.13	9.23	1.9	— .5	142	12.7	15.3
22.....	11.71	9.41	2.3	— .1	142	12.1	15.1

INDICATOR TEST OF ENGINE IN LIGHT AND HEAT TENDER "L 2," MARCH 31, 1890.

Card No.	Boiler pressure.	Initial pressure.	M. E. P.	I. H. P.	Revolutions.	Volts.	Ampères.	Watts.	Elec. H. P.	Mech. H. P.	Lamps.
5	67	54	29.5	11.6	391	99	60	5,940	7.96	9.15	142
6	712	50	27	10.16	391	100	53	5,300	7.10	8.16	122
8	78	67	24	9.43	391	100	49.5	4,950	6.84	7.64	112
11	85	70	18.7	7.43	395	100	36	3,600	4.82	5.54	78
13	86	72	13.9	5.5	400	100	20	2,000	2.68	3.08	34
15	76	63	11	4.44	402	100	12	1,200	1.61	1.85	26
19	80	71	6.6	2.6	400	Fields excited only					
20	80	75	5.1	2.39	400	Friction card.					
17	65	53	28.3	11.13	391	100	60	6,000	8.01	9.25	142
22	100	88	29	11.71	391	100	61	6,100	8.18	9.41	142

For a fair basis for monthly averages in running light, we may take the month of October; for this month the time of burning lights will be an average between the light load in July and the heavy one in January. In making up averages the daily reports of attendants on trains were used. With the old method having batteries and engine in the baggage car, the steam used for light was as follows:

Current used per lamp.....	54 watts.
Maximum lamp load, present train.....	152 lamps.
Total current.....	78,250 watt hours.
Electrical horse power hours.....	105
Mechanical horse power hours.....	117
Indicated horse power hours.....	139
From Table No. 1:	
Water per horse power hour.....	105 lbs.
" trip.....	14,000 lbs.

With the heat and light tender arrangement and Westinghouse engine the results are:

Current used per trip.....	48,000 watt hours.
Maximum lamp load.....	152 lamps.
Running time.....	112 hours.
Electrical horse power hours.....	50.4
Mechanical horse power hours.....	68
Indicated horse power hours.....	85.6
Water per horse power hour.....	57.8 lbs.
" trip for light.....	4,948 lbs.

In the considerations which led to the development of this tender car the question of heating was, perhaps, as important as that of lighting. It was found by careful experiment that 100 lbs. of water per car per hour was needed to properly heat the train when the temperature was 10 degrees above zero, and 70 lbs. of water was required with the temperature 27 above zero. The through trains to which the tender is attached weigh about 500 tons, requiring about all the power of the locomotive to make their schedule time. The drain for heating and lighting would naturally be greatest at times when bad weather made the greatest demands upon the locomotive for traction. A separate tender car carrying its own boiler

for heating and lighting, therefore, seemed the most feasible solution. It will be suggested that the additional train load might go far to counterbalance the drain upon the locomotive for heating and lighting, but the experience of the St. Paul is that for these latter purposes from 10 to 12 per cent. of the steaming capacity of the locomotive is absorbed in severe weather, and it is the unanimous statement of engine runners that they would rather have the extra car than be obliged to supply steam for the train.

The great feature of the car is its ability to supply at all times ample steam for heating, and a reliable light without expensive batteries or complicated machinery. There has not been a single failure of the light since the cars were put into service Jan. 15 last. Considering that the car was designed and developed from the foundation, with no previous experience with a similar arrangement, this immediate success is remarkable, particularly as the work of designing and constructing the first car was done in about sixty days. Up to this time very few improvements are suggested by use. The boiler steams well and fires easily, and, although too large for lighting alone, it is about right for its calculated duty of heating and lighting ten cars. It is estimated that the cost of this car is very close to that of the extra cost of storage batteries and of the more expensive system of wiring necessarily used where they are employed.

There are two of the tenders in use; they run between Chicago and Minneapolis. The company now has about 45 cars wired for electric lighting, running in four trains, two trains between Chicago and Minneapolis, and two between Chicago and Omaha and Sioux City. These trains are also heated by steam, and have temperature regulators and forced ventilation.

Wooden Trestle Bridges.*

BY WOLCOTT C. FOSTER.

HIGH TRETTLES ON THE ST. PAUL, MINNEAPOLIS & MANITOBA RAILWAY.

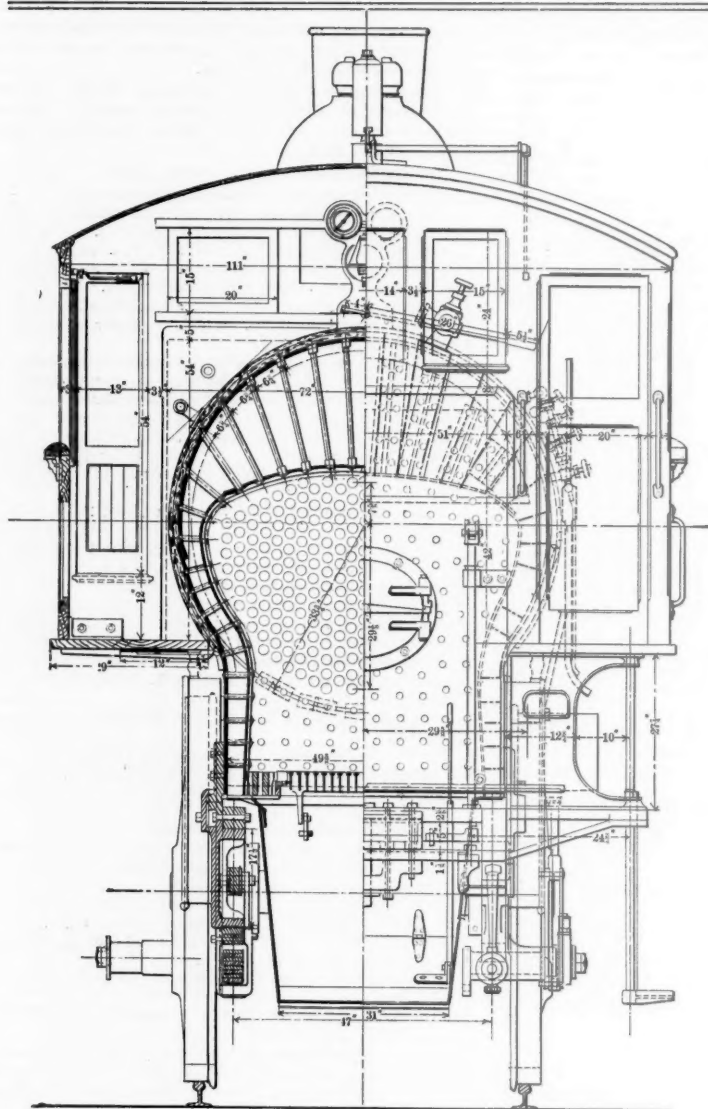
The cuts accompanying this article represent the construction of several very high trestles on the St. Paul, Minneapolis & Manitoba Railway, of which road Mr. N. D. Miller is the Chief Engineer. These trestles are really wooden viaducts. As will be readily seen by an examination of the drawings, they belong to that class of trestles in which the posts are continuous, being formed lengthwise by placing sticks of timber end to end, making a butted joint. The posts are also compound, two timbers being placed side by side and bolted together. The timbers are separated from each other a distance of 6 in. by a wooden splice block. The joints in the posts are, of course, broken, no two joints in the same post coming over the same block. The trestle while divided into stories cannot, from the principle of its design, be divided into decks. It is, in fact, a single deck structure.

In examining the floor the first thing noticed is the entire absence of any kind of guard rails whatever. This lack of even the cheapest device to keep a derailed train upon the bridge can hardly be too strongly condemned. A 10-in. by 10-in. guard rail added to the floor would increase the cost of the trestle but very little, indeed the difference would hardly be noticed, while it would add very greatly to the safety of a derailed train, and even to the safety of the structure itself in case of an accident. A properly notched and fastened guard rail would certainly prevent the bunching of the ties and thus save the trestle from a very probable partial, if not complete, destruction in case of a derailment. In other respects, the floor appears to be fairly good. The ties are of a good length and their outer ends are supported by jack stringers. They are spaced 8 in. apart, that is 16 in. between centres.

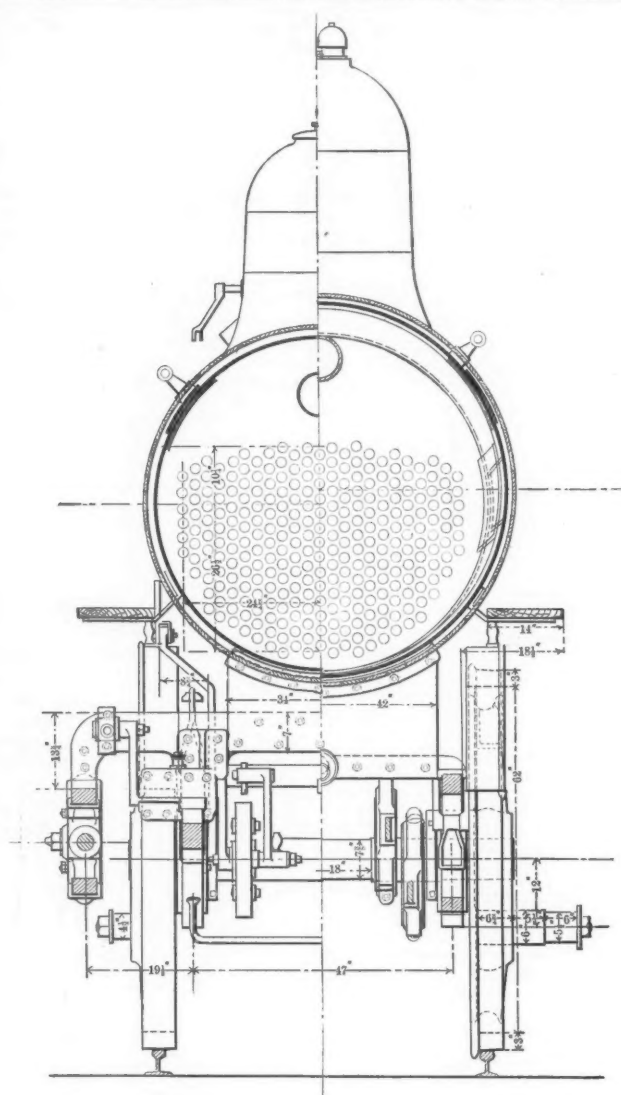
The track stringers are each composed of two 7-in. x 14-in. sticks of timber 20 ft. long, while the jack stringers are composed of but a single stick of the same dimensions. Both the jack and track stringers are supported on what may be called floor beams. These floor beams are made of 12-in. x 12-in. timbers, 14 ft. long, and there are four of them (more properly three) to each span or bay. They in turn are supported by four timbers, 12-in. x 12-in. x 30 ft., which might be called secondary or sub-stringers or girders. One of these girders is placed over the top of each post, and rests upon corbels, to which it is fastened by two bolts. Each girder is strengthened in the centre by a straining beam and knee braces. Hence this brings this design into still another class of trestles, known as knee-braced trestles. While knee-braced trestles are as a whole condemned by some engineers, still they have many features to recommend them, one and not the least of which is their great economy in timber. The straining beams are of 10 in. x 10 in. material, bolted to the girders. The knee braces are made from timber of the same dimensions. Their lower ends butt against the posts and against cast iron foot blocks bolted to the posts. The use of this style of construction admits of a greater distance between bents; in this trestle they are spaced 30 ft. from centre to centre.

The cap, if such it may be called, contrary to general practice does not support any weight, but rather acts merely as a tie beam to hold the tops of the posts in the proper relative positions to each other. It consists merely of a single 6-in. x 10-in. timber 14 ft. long, bolted between and clamped by the two sticks composing the

* Copyright 1890, by W. C. Foster, and condensed from his forthcoming book on the same subject.



Half Cross-Section through Fire-Box and Half Rear Elevation.



Half Cross-Section through Front Drivers and Half Cross-Section through Main Drivers.

BALDWIN TEN-WHEEL EXPRESS LOCOMOTIVE—NEW YORK, LAKE ERIE & WESTERN RAILROAD.

sheet and without annealing should have a tensile strength of 55,000 lbs. per square inch and an elongation of 30 per cent. in section originally 2 in. long. Sheets will not be accepted if the test shows a tensile strength less than 50,000 lbs. or greater than 65,000 lbs. per square inch, nor if the elongation falls below 25 per cent. Should any sheets develop defects in working they will be rejected.

Fire-Box Copper.—Copper plates for fire boxes must be rolled from best quality Lake Superior ingots; they must have a tensile strength of not less than 34,000 lbs. per square inch and a elongation of from 20 to 25 per cent. Test strips must be furnished with each fire box plate for testing.

Iron and Steel Stay-Bolts and Boiler Braces.—Iron or steel for stay-bolts and braces must have an ultimate tensile strength of not more than 60,000 lbs. nor less than 50,000 lbs. per square inch, with an elongation of not less than 30 per cent., nor undergo a reduction of area of fractured section of more than 35 per cent.

Copper Stay-Bolts.—Copper stay-bolts must be manufactured from the best Lake Superior ingots; they must have an ultimate tensile strength of not less than 34,000 lbs. per square inch, and an elongation of from 20 to 25 per cent.

Boiler Tubes of Steel or Iron.—All boiler tubes must be carefully inspected and be free from pit-holes or other imperfections. Each tube must be subjected to an internal hydraulic pressure of not less than 500 lbs. per square inch by the manufacturers before delivery. They must be rolled accurately to the gauge furnished by the Baldwin Locomotive Works, filling the gauge to a plump fit. They must be expanded in the boiler without crack or flaw.

When tested, iron and steel tubes must show a tensile strength of not less than 55,000 lbs. per square inch, and a ductility of not less than 15 per cent.

Boiler Tubes of Brass or Copper, Brass and Copper Pipes.—Tubes of brass or copper to be of uniform circumferential thickness and solid drawn; to be perfectly round, and to resist an internal hydraulic pressure of 300 lbs. per square inch. From the tubes under test a piece 4 in. long will be cut, annealed, sawn lengthwise, and doubled inside-out without showing sign of cracks. When annealed they must withstand flanging cold a flange $\frac{1}{2}$ of an inch broad for 2-in. tubes without cracking. Copper tubes must withstand flanging hot as well as cold. Tubes other sizes than 2 in. diameter must flange to a width proportional to their diameter. A piece 30 in. long, annealed and filled with rosin, must withstand being doubled until the extremities touch each other without showing defects. A piece 30 in. long, not annealed, filled with rosin, and placed on supports 20 in. apart, must withstand bending to a deflection of 3 in. without showing defects.

Bar Iron.—Bar iron should have a tensile strength of 50,000 lbs. per square inch and an elongation of 20 per cent. in section originally 2 in. long. Iron will not be accepted if tensile strength falls below 48,000 lbs., nor if elongation is less than 15 per cent., nor if it shows a granular fracture.

The most striking peculiarity of this locomotive is the

boiler. It has, as will be noticed, a radial stay wagon top, of which but few are in use. The first boiler of this kind of which we can find any record was made for the Denver & Rio Grande by the Baldwin Locomotive Works, in order to meet two conflicting demands, one for a wagon-top boiler and the other for a radial stay boiler. To accomplish this, the wagon top has been extended one course ahead of the fire box, and from that point slopes to the first course of the shell, as shown. On this extended wagon top the dome is located, the shell being flanged up into the dome and the dome sheet flanged down on to the shell. Inside of the boiler is placed a stiffening ring 4 in. wide and $\frac{1}{2}$ of an inch thick, through which pass the rivets that hold the dome. This part of the boiler, being cylindrical in shape, is not braced laterally or vertically. The joints throughout the boiler are butted with lapped welds 10 in. wide on the outside and 15 $\frac{1}{2}$ on the inside, as shown in the end elevations and sections. The fire box has a raised crown sheet through which pass the radial stays to the outer shell and hold the crown sheet in position. On some of the engines nuts are placed on the ends of the six centre rows of stay bolts on the under side of the crown. The longitudinal bracing of the boiler is made with rods, as shown, the back end of the rods being attached to the radial T-irons shown in the rear end elevation, the front end being attached to the shell. The position of the radial stays is such as to permit the long stays to be placed in desirable positions, and in this respect, as well as in some others, staying can be more easily arranged in this type of boiler than in those boilers where the crown is supported by crown bars, or even in the Belpaire designs, in which cross stays are used.

Regarding this boiler, we shall have more to say in a subsequent issue, in which we shall illustrate the details of the construction. One especially admirable feature of this design is the large amount of steam space above the water line. Probably no locomotive in passenger service to-day of the same power as this engine, has as much steam space above the water in proportion to the steam used per minute as the design here illustrated.

Some of the designs of this company have had a deeper fire box at the front end, the frame being dropped down back of the main driver, thus permitting a greater depth of fire box at that point. That, it would seem, is a better design, at least for soft coal burning, than the one shown, which is for hard coal. It is a pleasure to note that the ungainly and insecure links which were formerly used to attach the boiler to the frame where the

fire boxes were placed on top of the frames have been discarded in this design, and that instead a simple and substantial expansion joint is substituted.

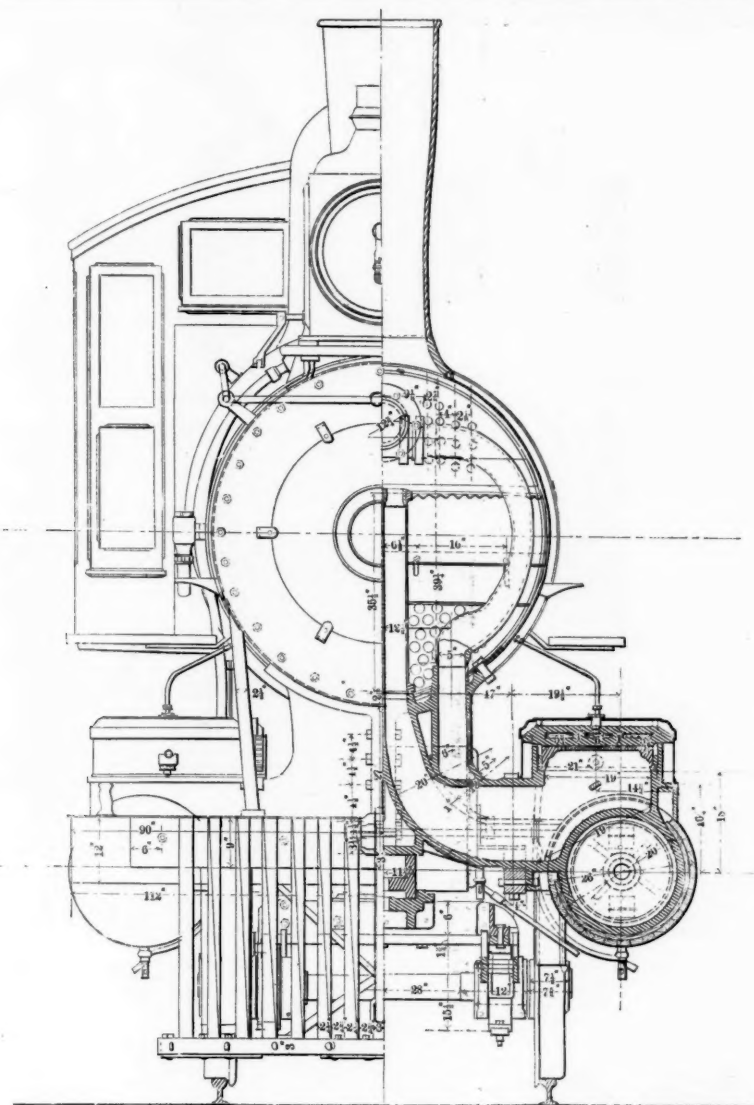
The equalizer system and spring arrangements are such as to make a particularly easy riding locomotive, as it will be noticed that each equalizer has a spring at both ends, which prevents to a large extent a tendency to sticking of the driving boxes in the jaws and jarring of the engine, as well as a tendency to undue wear in the joints of the equalizers common to systems of equalization which have an insufficient number of springs.

It will be noticed that the front drivers are very close together, and that the total wheel base is short. This probably accounts for the ease with which this locomotive passes sharp curves. The blank tire is on the front driver, and the engine ought to act on curves exactly like an 8-wheel locomotive with a rigid centre front truck when such 8-wheel has a $7\frac{1}{2}$ ft. spread of drivers.

The crosshead is of the Pennsylvania type, with top and bottom bar guides. The link motion has some peculiarities. The most striking is the valve rod connection to the rocker, which is made by a block sliding in a slotted crosshead, the back end of the valve rod passing through a bushing of the yoke. The eccentric rods pass over the forward axle, which, while it gives a slightly better valve motion, throws considerable weight on the pin connections, and because of the shape of the eccentric rod, induces vibrations which lead to slight irregularities in action at high speeds.

The bearing in the top of the link lifter is not directly above the centre of gravity of the link and the eccentric rods, which in the case of such heavy rods might be considered more satisfactory. Many engines are now built with the upper pin bearing in the reversing shaft to meet this objection. Some of the recent designs of 6-wheeled connected express locomotives have been built with a shorter link radius and eccentric rods with a connection reaching forward to an intermediate rock shaft. Neither of these arrangements are highly satisfactory, but there seems to be no alternative except it be to use an extremely short radius of link, allowing the rocker to pass out between the drivers, which in this case, with a short front wheel base, would not be satisfactory, and as a whole this design of valve motion is a selection of the least of two evils.

The cab fittings and the handles for the engineer are arranged in convenient positions, and it is an advantage incident to this type of engine that there is a large amount of room in the cab for the engineer even with ordinary widths of cab. All of the steam fittings are



Half Front Elevation and Half Cross-Section through Cylinders.

BALDWIN TEN-WHEEL EXPRESS LOCOMOTIVE—N. Y., L. E. & W. RAILROAD.

placed in a combination stand in front of the steam gauge within easy reach of the engineer. One of the most interesting details is the ash pan, which is arranged in such a manner as to give a large capacity and an accessibility not common to this type of engine. It will be noticed that the bottom of the pan extends the full length of the fire box and is not carried up over the axle. The rear axle passes through an oval tube about in the centre of the length of the pan. Other points of interest are the large exhaust passages in the cylinders, large steam pipes and throttles, the cast iron smoke stack, which is the Erie standard, and the location of the deflecting plate close to the tube sheet. This is a location which is not generally followed, it being believed by many that the deflecting plate when placed ahead of the branch pipes permits a more uniform draft on the tubes; but in this case such a location would decrease so materially the area of netting in the arch as to necessitate an extension of the smoke box.

The frames have the lower braces welded in. This is a mode of construction which is being favorably considered now by those who formerly believed in bolts instead of welds, and there is a strong tendency toward welded frame rails at the present time. The crank pins where they enter the wheels have a raised V-shaped collar common in foreign locomotives for the purpose of removing the tendency to cracks and breakages at this point.

The Hall Automatic Block Signal.

We print herewith a diagram showing the arrangement of battery, wires, electro-magnets and circuit closers as used in the operation of the Hall automatic electric block signal. This signal has been in use on the Boston & Albany, and New York, New Haven and Hartford for over a year, and is now being put up for use on

six miles of the New York Central & Hudson River. The principal characteristics of this system were described in the *Railroad Gazette* of June 6, and reference was made to it also in the issue of Jan. 24. The track instrument by which the wheels of trains open and close the electric circuit (which is conducted from one end of a block section to the other by wires strung on poles) was illustrated in the *Railroad Gazette* of March 28. This instrument is regarded by the manufacturers as one of the important features of the system on account of its great durability and satisfactory operation. Instruments of this kind have to withstand a great number of very severe shocks, and the making of proper provision against injury or too rapid deterioration from this cause has been made the subject of much experiment among users of track instruments.

The illustration shows the arrangement for operating a simple block signal circuit. At the entrance of the section is located the "block" track instrument, *C.S.*, the operation of which sets the signal at danger. The similar instrument at the other end, *O.S.*, is called the "clear" track instrument, its function being to restore the signal to the safety position. These two instruments are alike in principle and construction, except that the clear instrument stands normally open, while the block instrument stands normally closed. The "clear" track instrument is located 1,500 or 2,000 ft. beyond the end of the section, so that the longest train will be wholly clear of the section before the foremost wheel touches it, though the circuits are so arranged that the signal does not go to the safety position until the whole of a passing train goes over the instrument.

R is the relay and *X* the battery. They may be located at any point within the block. *D* is the signal disc mounted on the end of a rod whose other end has a counter-weight. The central portion of this rod consti-

tutes the armature of the electro-magnet, and when the latter is devitalized, the disc, being heavier than its counter-weight, falls by gravity, bringing the armature into a position parallel to the cores of the magnet. The curved pieces shown on the ends of the armature are of such shape as to remain within the magnetic field ready for the next operation. It will be observed that the cores are enlarged and extended a considerable distance below the coils. The circuit is closed and signal *D* is held at safety, as shown, the circuit being completed from the battery *X* through wire 1, track instrument *C.S.* wires 2 and 3, electro-magnet *S*, wire 4, contact point *p*, wire 5, electro-magnet *r*, wire 6 to battery. A train in entering the section opens this circuit, the first wheel of the train breaking the contact between the spring and its anvil at *C.S.* Electro-magnets *r* and *s* are demagnetized, signal *D* falls to danger and the contact at *p* is broken. After the whole of the train has passed over the "block" instrument the contact between the spring and its anvil will be restored; but as the circuit is now broken at *p*, the signal will remain down (at danger) until the points at *p* are again brought in contact; that is, until the train in passing out of the section completes a circuit that shall energize electro-magnet *r*. This is accomplished by the closing of the spring of the "clear" track instrument, *O.S.*, which completes a circuit from battery *X* through wire 7, spring and anvil at *O.S.*, wire 8, electro-magnet *r*, wire 6 to the battery. The contact at *p* is now closed, and the signal circuit is complete, but the signal will remain at danger until the train shall have entirely cleared the "clear" track instrument from the fact that as long as the spring at *O.S.* is in contact with its anvil two circuits are completed, one through the clear track instrument and the relay magnet and the other through the block track instrument, signal magnet and relay magnet. As the resistance of the latter circuit is much greater than that of the former the signal will remain at danger as long as the clear track instrument spring is in contact with its anvil, which by means of the air cushion is continuous during the passage of a train at ordinary speed.

It will be seen that the connecting of the spring with its anvil at *O.S.* is equivalent to the crossing of wires 7 and 9, and that an accidental crossing of these wires would, therefore, cause the signal to fall to danger. The crossing of wires 1 and 4 would likewise cause the signal to fall to danger, as the current would be withdrawn from the signal magnet.

All the normal operations of the signal are by positive closing or opening of the circuit, which is effected by making and breaking a metallic contact. The disc is held at "safety" by a simple current of such strength as to make its adjustment easy. As the main current can be of any desired strength, no relay or other device for multiplying power is required. The movements of the relay magnet are equally positive and simple, and its armature needs no spring or delicate adjustment.

Where there are switches in the block section each switch is connected to a circuit breaker inserted in wire 1. The throwing of the switch from the main line opens the circuit and causes the signal to fall to danger the same as if a train opened the circuit by operating the block instrument. It is evident that any number of switches may be included in the circuit.

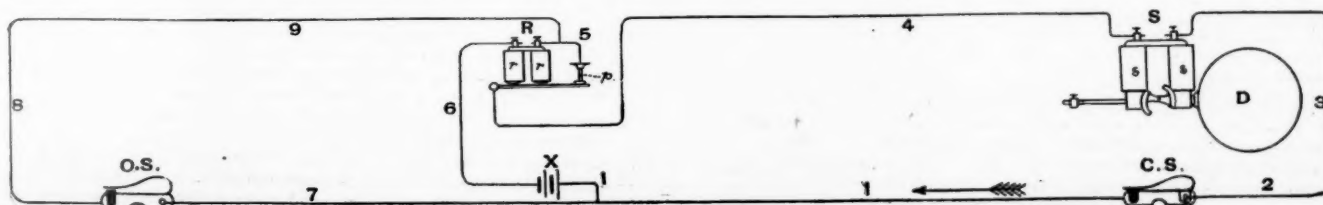
It will be seen that this arrangement makes no provision for permissive blocking, and that if a second train enters a section before the first has passed out, it is liable to have the signal set clear behind it and thus be left unprotected. Where the practice of permissive blocking is insisted upon, the company puts in a combination of circuit closers and electrical interlocking instruments by which a second train entering a section before the first has passed out will break the circuit which runs through the clear track instrument, so that the exit of the first train from the section will have no effect on the signal at the entrance to the same section. If a third train follows the second the same operation is repeated, and so on indefinitely, only the last train being able to restore the signal to the safety position.

The Wreck of the B. & O. Special.

A correspondent who was on the ground has sent us the following account of this derailment:

On Thursday, June 5, at 7:17 p.m., a special Baltimore & Ohio train, consisting of engine No. 711, with K. F. Wilson as engineer and Charles Byers, of the Ohio River Railroad, as pilot, and the Baltimore & Ohio Co.'s private car "West Virginia" was wrecked at bridge 33, on the Ohio River Railroad, one mile north of Clarington and 27 miles south of Wheeling, W. Va.

The occupants of the train, J. F. Legge, Superintendent of the Western Division; Major A. J. Hunter, Engineer Maintenance of Way, Western Division; Alfred Walters, General Superintendent east of Ohio River, and Major A. H. Johnson, Engineer of Maintenance of



THE HALL AUTOMATIC BLOCK SIGNAL—DIAGRAM OF ELECTRIC CIRCUITS.

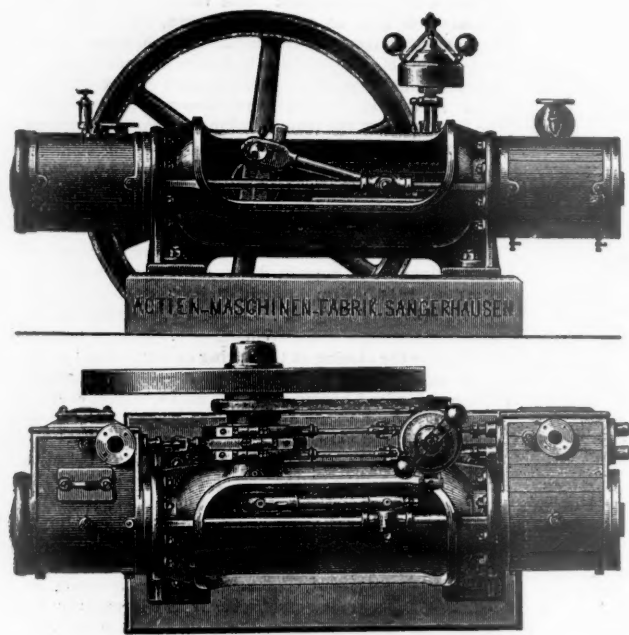


FIG. 3.—DIRECT-ACTING DRY SLIDE VALVE AIR COMPRESSOR.

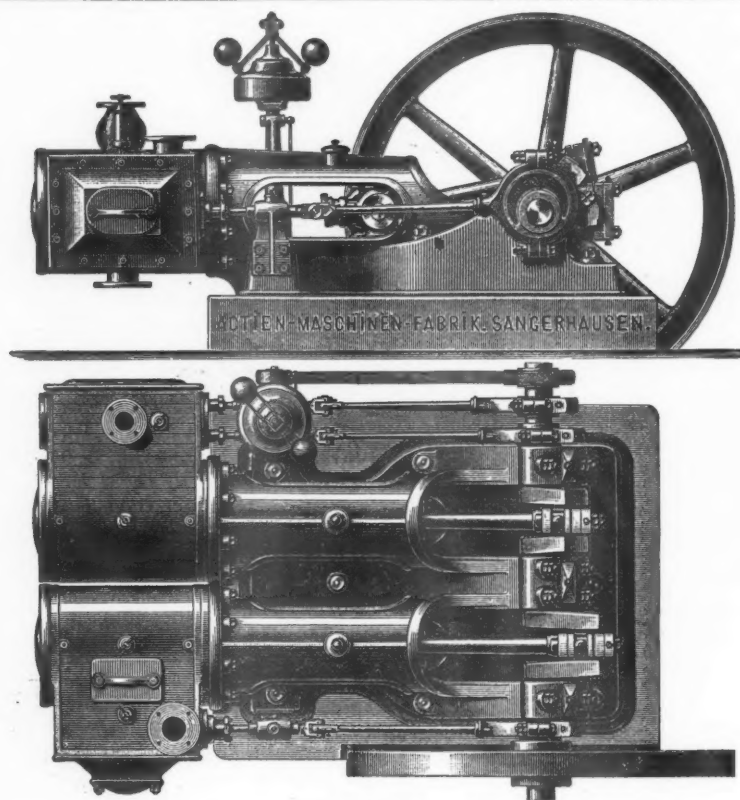


FIG. 4.—DOUBLE CRANK DRY SLIDE VALVE AIR COMPRESSOR.

Way, Eastern Division, all of the Baltimore & Ohio, had been making an observation tour over that road from Grafton to Parkersburg. The ultimate destination being Wheeling, these officials, to save considerable time, accepted the invitation of General Manager C. L. Williams, of the Ohio River road, to run on his tracks from Parkersburg to Wheeling, the distance being over a hundred miles shorter than to go back by way of Grafton. At Parkersburg General Manager Williams and J. F. Mock, Superintendent of Bridges of the Ohio River road, joined the party.

At a point about 40 ft. below the bridge No. 33, which really is only a trestle over a ravine which is at most seasons dry, the rear trucks of the tender left the track, and before any one on board could discover really what had happened the car rose bodily in the air and fell into the ravine, striking squarely on its roof, and collapsing until nothing but the furniture and interior construction held the floor and its heavy timbers from falling in upon the roof. The space between the floor and the roof of the car was not more than 2½ ft., and in turning over, all the occupants turned with it, and alighted on their heads and shoulders. Manager Williams, of the Ohio River road, was the first to extricate himself. He was badly bruised and cut, but was able to help the others out, and went immediately back to Clarington and telegraphed to Wheeling for surgeons. A small house occupied by a trackman is located but a few feet from where the car fell, and into it the injured were carried, and such relief as could be given them was rendered by a local physician who was called in. Mr. Legge had his right arm broken, and was cut in the shoulder. Major Hunter had several slight cuts and a severe contusion of the chest. He is thought to be very badly hurt, and was taken home to Grafton. Superintendent Walters was badly bruised and cut about the head and face. Major Johnson was severely cut about the head. His right hand is also badly broken. His right leg is severely sprained also, and was still helpless on Sunday. J. F. Mock, of the Ohio River road, was the worst injured man in the party. His head and face were cut, and his skull was fractured in such a way that the pressure from the bones paralyzed his right side for several hours. He was still delirious on Sunday, but the physicians retained hopes of his recovery. A. J. Shingleton, brakeman of the train, had his ankle badly sprained. H. Shaeffer, the conductor, was badly bruised. Frank Gonzales and Joseph Wilson, cooks, were both hurt.

As to the cause of the accident no tenable theory is advanced. An Ohio River passenger had passed over the same track in the same direction 45 minutes before, and nothing wrong was noticed. There is a difference of opinion as to whether it was the rear trucks of the tender or the front truck of the special car which left the track first. Byers, the pilot, thinks that the coach left the track first, but most of those on board believe that something fell from the engine. The track at the point is absolutely straight for 3,000 ft., the grade is level, and the trestle is the most substantial one on the road. The track was found in perfect gauge. The train was running at about 30 miles an hour. The wrecked car, "West Virginia," has been used as the General Manager's car of the Baltimore & Ohio ever since 1879, at which time it was built for Mr. Wm. M. Clements.

Dry Slide Valve Air Compressor.

The air compressor shown by the accompanying illustration has several novel features which make it worthy of investigation. There is a complete water jacket around the cylinder and cylinder heads, and also a passage which permits the compressed air at near the end of the stroke, after the slide valve closes, to pass over into the cylinder on the opposite side of the piston. These compressors are guaranteed to give an efficiency of 90 per cent., much of which economy is due, it is claimed, to the superior jackets, the passage for the compressed steam just referred to, the high speed and other features, which are described as follows:

Fig. 1 shows a section of the air cylinder with the a-

in the clearance space passing over to the opposite side of the piston, the piston not being quite at the end of the stroke. When it is at the end of the stroke the main ports, as well as this passage for connecting the clearance, is closed. In this illustration, fig. 1, a indicates the location of the water jacket b, the relief valve c, the springs for relief valve, and d, the channel for exit

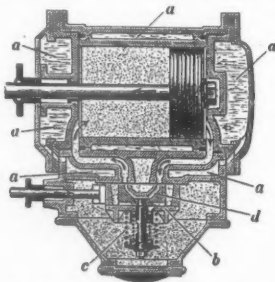


Fig. 1.—Section of Air Cylinder.

of compressed air from clearance space. The arrangement of the slide valve and the balancing plate is easily seen in this figure. The dotted sections represent the air space, and the straight horizontal line section the water jacket space.

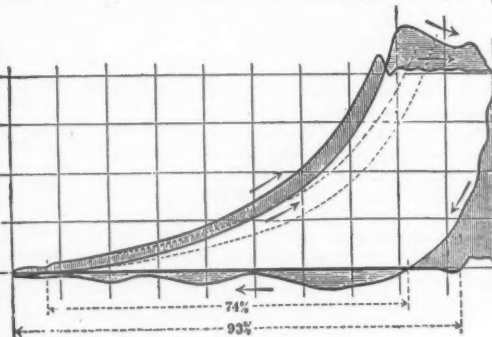


Fig. 2.—Comparative Indicator Diagrams from Ordinary and Dry Slide Valve Air Compressors.

It will be noticed that the effect of the channel contrived as just mentioned is such that at the end of the stroke a communication is effected between the clearance space at that end of the stroke and the other end of the cylinder, thus permitting the compressed air contained in the clearance space to expand into the other end of the cylinder instead of expanding with the piston on its return stroke. The modifying influence of this on an indicator diagram is shown in fig. 2, in which the vertical shading shows the parts of the dry slide valve air compressor indicator diagram where they overlap the diagram taken from the ordinary compressor. The horizontal shading shows the overlap of the ordinary compressor diagram. The effect of permitting the air from the clearance space to pass to the opposite end of the cylinder is evident from this diagram, in which the compression is practically nil. The relative efficiency of these cards, as taken from air compressors, is said to be

in the ratio of 74 to 93 per cent. in favor of the dry slide valve compressor, a gain of 19 per cent. at 80 pounds air pressure. It is probable that this percentage of gain would be materially increased if the receiver pressure was augmented.

The slide valve is rigidly connected to the driving parts, and its travel is made positive by the connections to the crank shaft. The action is noiseless, and because the admission and discharge valve from the compressing cylinder are directly operated from the crank shaft, a high piston speed is used with many revolutions per minute without excessive jarring of the valves. By this means the dimensions of the cylinders for a given capacity are less than in low speed compressors. The reduction of the final pressure of compression in the clearance space and the cubical contents of the clearance space assists in the reduction of the dimensions of the machine. It is, therefore, of comparatively small size.

The object of the water jacket is to obviate some of the difficulties incident to the injection of water as a spray into the cylinder. Several types of these machines are made, of which fig. 3 shows the direct acting compressor in elevation and plan, and fig. 4 a compressor with the cylinder arranged side by side with the cranks at an angle of about 90 degrees. Also are built larger compressors, with the air and steam cylinders on separate bed plates, as well as belt compressors.

The steam cylinders are fitted with an automatic cut off valve gear and a governor which varies the point of cut-off from 10 to 10 of the stroke, thus permitting varying quantities of air to be taken from the receiver without material change in the economy of the machine. The governor is provided with an adjustment to vary the engine speed of 25 per cent. either way from that for which the machine is listed.

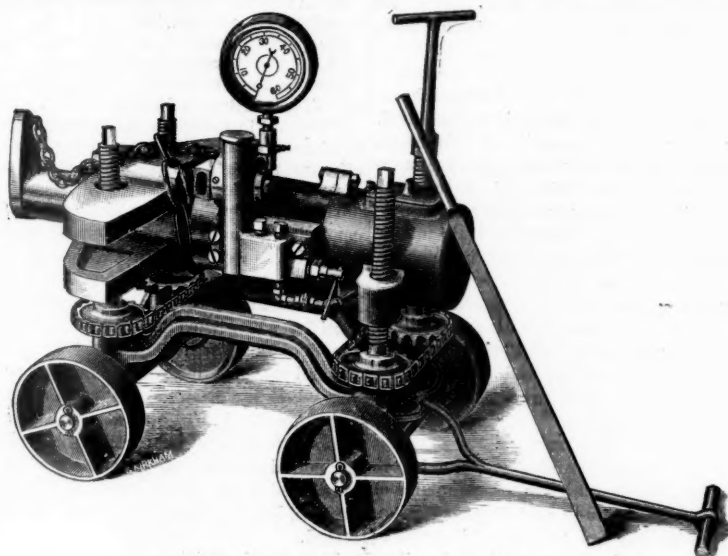
The angles of the cranks for the compressors are so selected that the distribution of the strains on the crank pins is nearly equalized over the whole stroke, which permits a considerable range of expansion, the use of light flywheels, and tends toward noiseless operation. This compressor is constructed at Saugerhausen, Germany. The agent in this country is Mr. George N. Comly, M. E., Edge Moor, Wilmington, Del.

Improved Crank Pin Press.

This crank pin press varies from those previously built by the same makers in that the truck is all iron, and the beam is at the end nearest the work; also, in having adjustable screws for regulating the height of the ram to suit the position of the pin. When pressing a pin to place, it has been found in some cases that the jack was lifted entirely off the floor by the strain. When the faces of the ram and the pin do not coincide exactly, the tendency is, when the heavy beam is at some distance from the work, to force the pin slightly out of true. It was to avoid this that this style was devised.

The pump which has heretofore proved so satisfactory is retained, being placed directly on the cylinder, which is made in one piece with cross-beam, in order to secure lightness. The chain, shown attached to the ram, is for pulling the ram back into the cylinder, without having to run it up against some heavy piece of machinery and using a crowbar.

An improved safety coupling is attached, so that the



Improved Crank-Pin Press, with Adjustable Screws.

shock caused by sudden releasing of pressure shall not cause injury to the gauge. The pump valves are large, and fall into their seats, requiring no rush of water to seat them. The bonnets are made metal to metal, requiring no packings, and all parts are made so that they can be easily examined or replaced. The length of beam on the 60-ton press is 28 in.; 100-ton, 32 in.; 125-ton, 34 in.; 150-ton, 36 in.

This press is made by Messrs. Watson & Stillman, New York City.

The Master Car Builders' Convention.

The twenty-fourth annual convention of the Master Car Builders' Association met at Old Point Comfort, Va., on Tuesday, June 10. Members began to arrive Sunday and the Hotel Hygeia was overcrowded. The time previous to the assembling of the convention was occupied with excursions, dancing, etc.

On Tuesday morning at 10 o'clock the convention opened with about 100 members present in the hall and others constantly arriving.

President Wm. McWood in his opening speech congratulated the association "that neither it nor its conventions had gone backward in numbers, in interest or in quality of the work performed," and said:

"It is very pleasant to notice the steady growth and development of the many railroad clubs throughout the country. The full discussion and interchange of opinions with the many subjects brought before them must tend to benefit the parent association. The very important question of the rules of interchange has received a great deal of attention at their hands and is, I consider, one of the most important subjects brought before this convention. Since the first general meeting in connection with the rules of interchange, which was held in the City of Chicago in 1875, incalculable benefits have accrued to railroads. It would be difficult to estimate how much joint inspection has done towards facilitating the movement of traffic and removing those obstructions which caused so many vexatious and expensive delays. Every member of the association is deeply interested in the improvement of these rules; but let me beg of you to consider carefully any proposed change, and only sanction it for good and sufficient reasons. Many alterations only lead to the confusion of those who have to deal directly with them, and the plainer the language the more easy of interpretation."

The Secretary's report showed the membership of the association to be: Active members, 141; representative members, 100; associate members, 6; total, 247.

The number of cars represented is 911,417, an increase of 104,887, of which 42,499 cars are represented by entirely new appointments and the balance by the old membership.

The cash collected by the Secretary is as follows: Dues, \$5,050; sales of rules of interchange, \$463; reports of proceedings, \$237; sundries, \$77.00; balance on hand last year, \$111.31; total, \$5,938.31.

The disbursements during the year are as follows, condensed: Saratoga Convention, \$211; report of proceedings, \$760.50; code of rules, \$192.16; letter ballots, \$57.40; miscellaneous printing and stationery, \$155.07; electrotyping, \$128; postage, \$108.30; office rent, \$224.04; Secretary's salary and expenses, \$2,000. Miscellaneous, \$163.03; cash to treasurer, June 4, 1890, \$1,878.81; total, \$5,838.31.

The report was accepted.

The following nominating committee was then appointed: F. D. Adams, J. Townsend, R. H. Wilbur, G. W. Rhodes, M. M. Martin. Also the following auditing committee: John McKenzie, J. N. Barr, E. D. Bronner.

It was proposed by Mr. Kirby to reduce the dues of active members from \$5 per year to \$3. This was discussed at length by Messrs. Adams, Schroyer, McWood, and others. Under the head of unfinished business Mr. J. H. Setchel was elected an associate member, and under new business Mr. D. L. Barnes was proposed as an associate member. A motion was made by Mr. T. A. Bissell, and amended by Mr. F. D. Adams, that locations for the next place of meeting be proposed at 1 p. m. Tuesday and voted on at 1 p. m. on Thursday. Remarks on this matter of location occupied considerable time, it being

proposed to adopt a permanent location. A motion to this effect was lost. The subject of location also brought up the question of the desirability of a meeting of both associations during the same week.

Mr. ADAMS: It would be of no disadvantage to meet at the same time, and it would shorten much the whole time occupied. Let this association meet Wednesday and the Master Mechanics' the Monday following. A committee from each side would fix it.

Mr. E. B. WALL moved the appointment of a committee to confer with a similar one from the Master Mechanics' Association with regard to the abridgment of the time occupied by the meetings.

The first report of the committee appointed in 1889 was then presented by Mr. E. W. Grieves, chairman.

STANDARD MARKING OF FREIGHT CARS.

This report recommends marking in accordance with the rule for line cars given on page 227 of the proceedings of 1889, and is, in substance:

Box Cars.—The half of side of car on which the doors do not slide to show the name of the railroad company (spelled out in full), the number of car to be placed immediately below it; when necessary, in order to get the full name of the railroad company, two lines should be used. Letters and figures to be 7 to 9 in. high. The light weight of the car to be placed below number of car, near the sill, using 3-in. or 4-in. letters. The half side of car on which the doors slide to be reserved for trade marks when used; the capacity of car and size of journal to be placed near sill on this half of car, using 3-in. letters and figures. The side doors to be marked near the top with initials and number of car, using 5-in. letters and 3-in. or 4-in. figures. Each end of car to be marked near the top, on the right-hand side, facing the end of car, with the initials and number, using 5-in. letters and figures.

Gondola cars to be marked in substantially the same manner. Both sides of bolster, transom or channel iron in each truck under all cars to be marked with initials of railroad company and number of car to which the trucks belong. Under a portion of each outside intermediate sill, near centre of car, to be painted with brown or black paint, and on this space the initials of railroad company and number of car to be stenciled, using 3-in. letters and figures and white paint.

Mr. WALL thought stock cars should be included.

Mr. VERBRYCK mentioned the difficulty of long names.

Mr. GRIEVES: The names of nearly all roads can be used as recommended, the few remaining ones can be put on with small letters.

Mr. ADAMS: Do not most doors slide to the right rather than as shown? The length of the cars ought to be put on the side as well as the other information. If we are to have a standard, then that standard ought to meet the requirements of the different roads.

Mr. WM. FORSYTH: The end mark on a car should be as high as possible so as to be read by the brakemen when passing along the top of the car. Also the name of road ought to be on the sills of a gondola car, so that a name may remain when the sides are removed.

Mr. ADAMS: I see no need of marking the size of journals on the car bodies. Supposing the trucks are changed, what then?

After further discussion of platform cars, stock cars and the desires of roads that want some "style" in their freight cars, the subject was referred back and the committee continued another year.

A communication from Mr. Wm. Garstang, Superintendent of Motive Power of the Chesapeake & Ohio, inviting all of the members to an excursion up the James River to Dutch Gap, was here received and accepted, and the date fixed for Friday.

The chair appointed the following committee to meet a similar one from the Master Mechanics' Association to abridge the time required for the meetings of the conventions, according to Mr. E. B. Wall's motion: F. D. Adams, R. C. Blackall, B. K. Verbruyck, John Kirby, John Lentz.

The report of the Committee on the Best Material for Brake Shoes was then called for. A reply was made by Mr. Godfrey W. Rhodes, chairman of the committee, which concisely stated and clearly outlined the work of the committee and was, in fact, a well condensed prelimi-

nary report in itself. The gist of the remarks was about as follows: We have not been negligent, and the absence of a report does not indicate that we have been idle. We organized early last year, as it was very important to secure a place for the tests and the facilities needed for accurate investigation. The Chicago, Rock Island & Pacific has offered all assistance for the road tests, and both the President and General Manager of that road have offered to assist in any way possible. Having obtained the facilities for tests, the next step was to locate the exact spot for the experiments on the line of the road. In order to feel our way and obtain satisfactory results, it was necessary to make preliminary tests. It was impossible to outline specific road tests without a knowledge of the probable results. Therefore, we appointed three sub-committees to work on shop tests of material. It was very difficult to produce in the shops the same conditions that exist in service. One of the committees has made a report on shop tests that appears to be indicative of what may be expected on the road. These tests have been given in the mechanical papers. (See *Railroad Gazette*, May 30, p. 374.) From there it can be seen that the friction varies but little, while in the wear there is a great difference; probably these indications will be borne out in the road tests. The friction varies so little between the shoes tested that there may be a difficulty in determining the difference in the stopping power of the shoes in service; that is, if one car stops in 700 feet, a small variation in the friction might not be seen in the length of the stop. If the stop could be magnified to several thousand feet, then the difference would be readily measurable. We have tried this with the dynamometer car and find it to be practicable, and it is safer also as the engine has not to be cut loose. Its weight, being unbraked, throws more work on the brake shoes of the dynamometer car and materially lengthens the stop.

To obtain the wear in service is difficult, and to get the actual wear of the wheels is perhaps impossible, whereas in the shop tests it is an easy matter. I have tried to find a pair of scales that will weigh the total wheels and axles with sufficient accuracy to indicate the amount of material worn off, but have not succeeded. We shall make tests with both chilled and steel tired wheels. In the shop tests the chilled wheel does not seem to wear. We made a shoe of chilled cast iron and found that when it was running on the chilled wheel there was considerable friction with but little wear of the shoe. On examination it was found that the wheel was wearing rapidly. We are hoping that the shop tests will be found to be so well substantiated in service that they will be of value in themselves, and that it will not be necessary to weigh the wheels and shoes in the road tests. Your committee report progress and ask for an extension of time. (Applause.) The committee was continued.

Next the report of the Committee on Steam Heating and Ventilation of Passenger Cars was presented, read and accepted.

REPORT ON STEAM HEATING AND VENTILATION OF PASSENGER CARS.

The devices used for regulating temperature are in general shut-off valves of various kinds by which the flow of steam is controlled. The Johnson Automatic Regulator is used by the Baltimore & Ohio and the Chicago, Milwaukee & St. Paul with very satisfactory results. The New York, Lake Erie & Western uses an attachment invented by J. E. Sague, which regulates the flow of steam to radiators as desired. The Delaware & Hudson Canal Co. uses a dial cock which shows amount of steam opening. As to the comparative merits of direct and indirect steam heat (the term indirect meaning that the steam is utilized for heating water which heats the car), the general opinion seems to be as follows: 1. Direct steam heats up cars in a shorter time than indirect. 2. Direct steam requires a lower pressure in main pipe. 3. Indirect steam gives a milder heat. 4. Indirect steam heat is less liable to fluctuations. 5. The use of indirect steam necessitates careful attention when cars are out of service to prevent the water in pipes from freezing.

As to the relative merits of inside and outside main steam pipes, all reports show that the main steam pipes are placed outside and beneath the cars, with the exception of the Chicago, Milwaukee & St. Paul. On that road the main steam pipe and connections are placed overhead and inside the cars, the advantages claimed being that more direct communication is effected, the pipes can be so arranged that there is a positive fall for water of condensation from the main pipe and all radiators to the trap and all pockets for water can be avoided. The data obtained as to consumption of fuel is somewhat meagre. Tests by the Delaware & Hudson Canal Co. show with the commingler system that an average of 49 lbs. of water per car per hour maintained the temperature inside the car 33 deg. higher than the outside temperature, and the temperature of the discharged water was 134 deg.

Tests on the Chicago, Milwaukee & St. Paul show as follows:

Outside Temperature.	Inside Temperature.	Water of condensation per car per hour.
40°	70°	70 lbs.
30°	70°	85 lbs.
10°	70°	100 lbs.

These figures agree quite closely with the results obtained from some tests made on the Old Colony by Prof. Lanza for the Massachusetts Railroad Commissioners.

All reports indicate that hose connections are used exclusively. The Baltimore & Ohio and the Chicago, Milwaukee & St. Paul use the Gibbs coupling. No report as to the coupling used by the other roads.

The provisions made for heating cars in yards consist almost entirely in utilizing some stationary steam plant. Car stoves are also used, the fires being removed when cars are placed in service. In all cases the necessary heat when steam system becomes inoperative is obtained

(Continued on page 421.)



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A butting collision of freight trains on the Wabash, near Warrenton, Mo., on Monday afternoon last, was unusually disastrous, one of the trains being loaded with race horses, accompanied by their keepers. Eight of these men were killed and 25 injured. The press dispatches say that the cause of the collision was a mistake in a telegraphic order, a message giving notice that a certain train would be two hours and five minutes late, being delivered "two hours and 50 minutes late." Fifteen valuable horses were killed, and the total loss will be many thousand dollars. As is well understood by every one who has carefully observed the causes of previous collisions from causes similar to this, the error will quite likely be found to be a complex rather than a simple one, and in the absence of more specific information we will defer comment. The simple fact that freight trains carrying passengers should be handled with more care is, however, shown in a vivid light by this disaster. We have often alluded to this point, the record of passengers killed on American railroads including one or more persons who were riding on some portion of a freight train nearly every month. There are many hundred miles of road in this country on which it is impracticable to run more than two or three passenger trains daily. On these it seems to be almost a necessity that passengers be carried on freight trains. If this kind of transportation cannot be abolished, it behooves railroads, for humanity's sake, to adopt better regulations for safety. It may indeed be said that men in charge of live stock must necessarily incur extra risks and that their case is not to be classed along with those of stray passengers riding a few miles in a caboose. But the circumstances are nevertheless substantially parallel, the essential point being that freight trains carrying passengers should be given the same care that is bestowed on passenger trains. We are not now saying that passengers' lives are more precious than those of trainmen; it is simply a matter of arithmetic. Five, 10 or 20 persons on a train demand greater protection than is given where there is only the minimum crew; or, at least, there is less excuse for laxity. The fact that these horsemen may or may not have released the railroad company from pecuniary liability should really have no bearing at all on the question.

A tender car for lighting and heating through trains is quite fully described in this issue. The experiment is one of particular interest. At first thought it seems obviously bad economy to add a car to a train, simply to light and heat it; but under the special conditions of this case it seems to be good economy. We have not enough data to make a careful estimate of the operating cost of the St. Paul plan and therefore shall not attempt it. The experience of the company so far appears to demonstrate that, where it is desirable to light heavy through trains by electricity and heat them by steam, the separate tender plan is the best one yet tried. That it is desirable to heat all through trains by steam is pretty generally granted; in fact, it has become almost a business necessity. Lighting them by electricity is popular and attractive at any rate; but it is by no means certain that it will be very generally done. But where the two are to be done,

no other plan seems to promise better than that of the separate light and heat tender. The steam taken from the locomotive for driving an engine and for heating is found to be a severe drain upon its capacity on the New York and Chicago "limited" of the Pennsylvania; the runners grumble about it a good deal. In the severer climate of Wisconsin and Minnesota, where more heat is needed and where there are more wind and snow to retard the trains, this extra consumption of steam is often enough to prevent making schedule time; as, indeed, we suspect it is in milder climates. Granting, then, that steam heat and electric light are both to be used, the question comes to this: Is the percentage of increase of train resistance with the tender car greater than the percentage of loss of locomotive efficiency without it? Until more is known of the relative cost of maintaining and operating the separate tender, it is hardly worth while to discuss the other elements of the problem.

The subject of through import rates has come before the Interstate Commerce Commission, on complaint of the New York Board of Trade and Transportation. The charge is, that the through rate from Liverpool to points in the interior, minus the ocean rate, is less than the domestic rate. Putting it in another way, the rate from New York to points west, for New York men, is more than the charge made for the same service to Liverpool men. At points like New Orleans, which can only share in the import trade to northwestern points at a sacrifice, the discrepancy is still more marked. The case is substantially the same as that of the export grain rates, only in the reverse direction. If the decision in the export case were accepted without question, there would be nothing to argue. But the export decision does not stand unquestioned. In fact, it is not in line with other decisions of the Commission itself. A through bill of lading has been held to constitute a through rate, and the physical circumstances of shipment or reshipment are treated as of secondary importance. Why should not the principle be applied to Liverpool business, and the direct rate be treated as an individual whole, representing a single commercial transaction? Why, in other words, should the application of the principle stop short at an international boundary? This question has not been satisfactorily answered; and, until that is done, neither the question of export nor of import rates can be regarded as settled.

The dressed beef rate war is almost a repetition of that which took place some two years ago. The Grand Trunk is fighting for a differential of three cents; the other roads are fighting against it; there seems to be no possible compromise. The serious thing is that the shippers, when as well organized as they are in the dressed beef industry, can precipitate such a war as often as they choose. They are organized; the railroads are not allowed by the Interstate Commerce Law to have any effective counter organization. If shippers threaten to withdraw their business from the Grand Trunk unless it receives a differential, the Grand Trunk must demand it. If other shippers threaten to withdraw theirs from the Lake Shore unless it meets the Grand Trunk's rate, the Lake Shore must enter the fight. A pool would enable them to protect themselves; without a pool they must fight, whether they want to or not.

The Efficiency of Locomotives.

On another page will be found a communication under the above title from Mr. Dixon, pointing out what he considers some errors in our editorial criticism of his paper read before the Cincinnati meeting of the Mechanical Engineers. Since his letter was received there has appeared in the *Railway Master Mechanic* a criticism on our editorial much to the same effect as Mr. Dixon's letter, but quite lacking in logical argument, and showing anything but a good understanding of the fundamental principles of mechanics. The most palpable error in the latter criticism is, in effect, an attempt to show that pressure alone can be the equivalent of work done.

There is an evident misunderstanding between Mr. Dixon and ourselves regarding the meaning of the first statement in the editorial which he criticises. We say that the engine with the least clearance is proved by the paper to be the most economical and powerful. This is clearly evident from an inspection of the cards which are illustrated in the paper referred to, as the following will show:

The mean effective pressure of card with 10 per cent. clearance is 94.6 lbs. per square inch.

Comparative amount of steam used per stroke, as shown by this card, is 8.4=(proportionate number).

Pounds of mean effective pressure for each unit of the proportionate number is 11.25,

Mean effective pressure in card with 2 per cent. clearance is 91.8 lbs. per sq. inch.

Comparative amount of steam used, as shown by this card is 6.48=(proportionate number).

Pounds of mean effective pressure per square inch per unit of proportionate number is 14.16.

Difference in mean effective pressure per unit of proportionate number is 2.9 or 25.7 per cent. greater mean effective pressure per pound of steam used in the case of 2 per cent. clearance.

This not only shows the locomotive with the 2 per cent. clearance to be considerably more economical, but to be, as we have stated, also more powerful where the limit to power is found in the rapidity of steam generation, as the case is in a large percentage of locomotives when working hard. However, our correspondent can hardly be blamed for misunderstanding us, and we were in error in not stating more clearly just where the difference in economy and power was to be found. It was passed by as being self-evident, whereas to have stated that the mean effective pressure per pound of steam used is greater when the clearance is reduced would have removed the ground for discussion, leaving the conclusion in our editorial just as stated.

The second criticism by our correspondent is with reference to the remarks made regarding his statement that "if compression takes place suddenly, as is the case in cylinders having very small clearances, the heat does not have time to become equalized between the steam and the cylinder walls, etc." From this statement it is but natural to infer that what is meant is that not as much heat is extracted from the steam during sudden compression and in cylinders having small clearances, because there is not sufficient time for the transfer to be made, and it is in this that our correspondent leads one to suppose that the condition of sudden compression is one in which considerably less heat is extracted from the steam by the cylinder wall.

Perhaps we should have said *less* rather than *no* heat is taken from the steam during compression, but the argument would not be changed, neither would the conclusions, they being clearly logical. The point is to show that a condition of steam engine operation, where either *less* or *no* heat is taken from the steam during compression, is a desirable one for economy, rather than as stated in the paper.

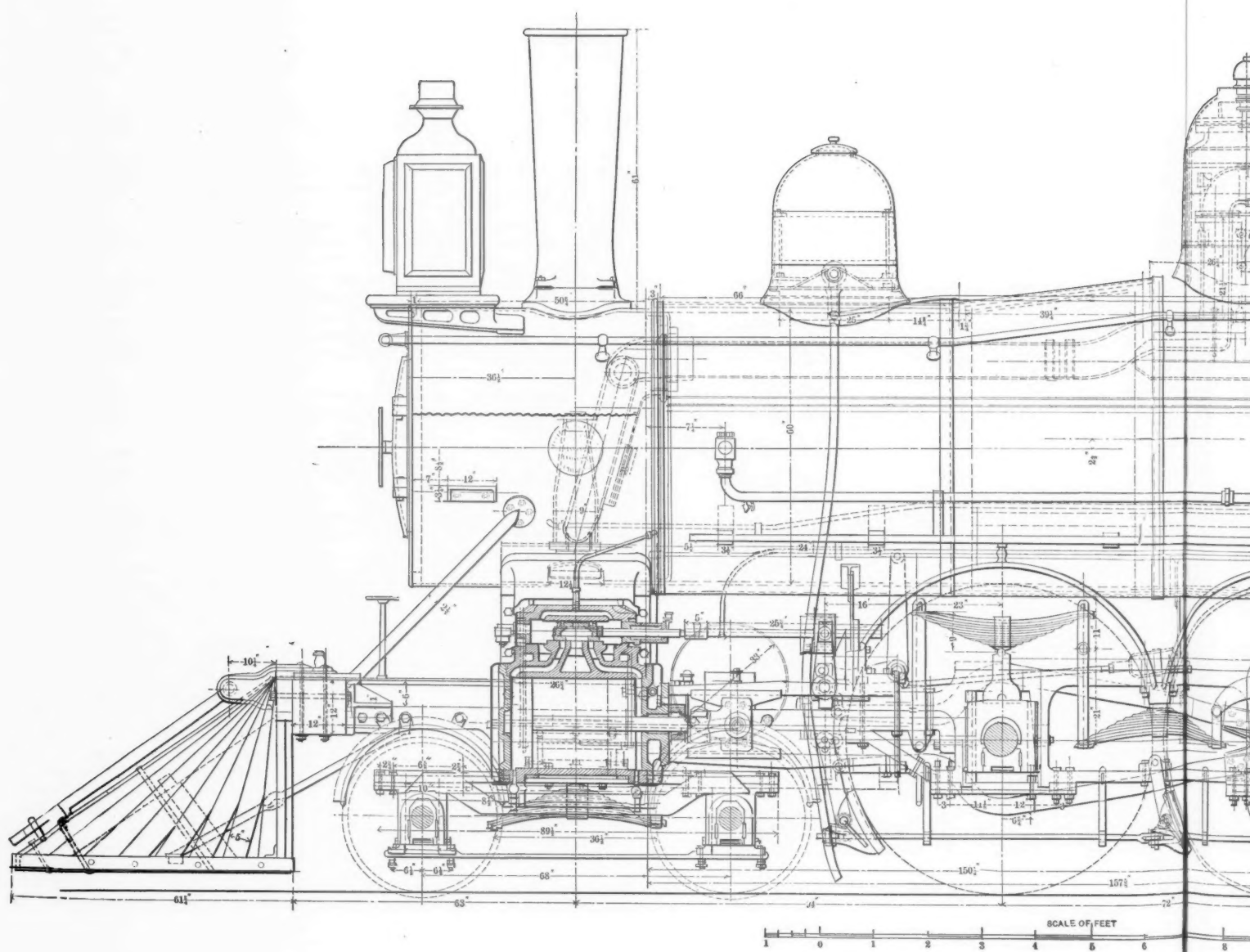
As no reference was made in Mr. Dixon's paper either to the adiabatic or to the isothermal line, we must still think we were in the right. But accepting the latest interpretation of our correspondent, the truth of his argument does not appear. It is based on a compression, to equal pressures from equal back pressures, and upon this basis, that is, with the same terminal and initial pressures of compression and the same character of steam, a greater amount of work would be done during compression when heat is taken from steam during that period rather than less, as stated in the paper. Thus this argument for greater work rather than less follows logically, because the ratio of the changes in volumes to raise from equal to equal pressure of saturated steam, initial and terminal, would be different in the two cases, and where heat was transferred to the walls of the cylinder the exhaust must close earlier in order to reach the same point of compression, and the area of the card would be found to be greater between the back-pressure line and the zero line; hence more work would be used to effect the same terminal pressure.

There are other reasons why large clearances are undesirable in locomotive engines, and reasons which are brought to mind by this discussion and which bear upon the point in question. One of the most important of these reasons is because of the larger proportionate area of surface of wall exposed to the steam in the clearance space than in the cylinder proper. For instance, in an 18-in. cylinder the area of wall, up to a common cut-off, is $\frac{5}{16}$ sq. in. to each cu. in. of volume, while in the clearance space of the same cylinder the area is 1.4 sq. in. per cu. in. of volume. This increase must tend to increase condensation.

Now we have no doubt that the arguments which Mr. Dixon meant to advance are correct, but for some reason, either the extreme condensation of the argument or because of haste in preparation, the statements appear to be contradictory to each other and to accepted mechanical theories. From a personal acquaintance we know the paper is not to be taken as indicative of the author's knowledge of the subject.

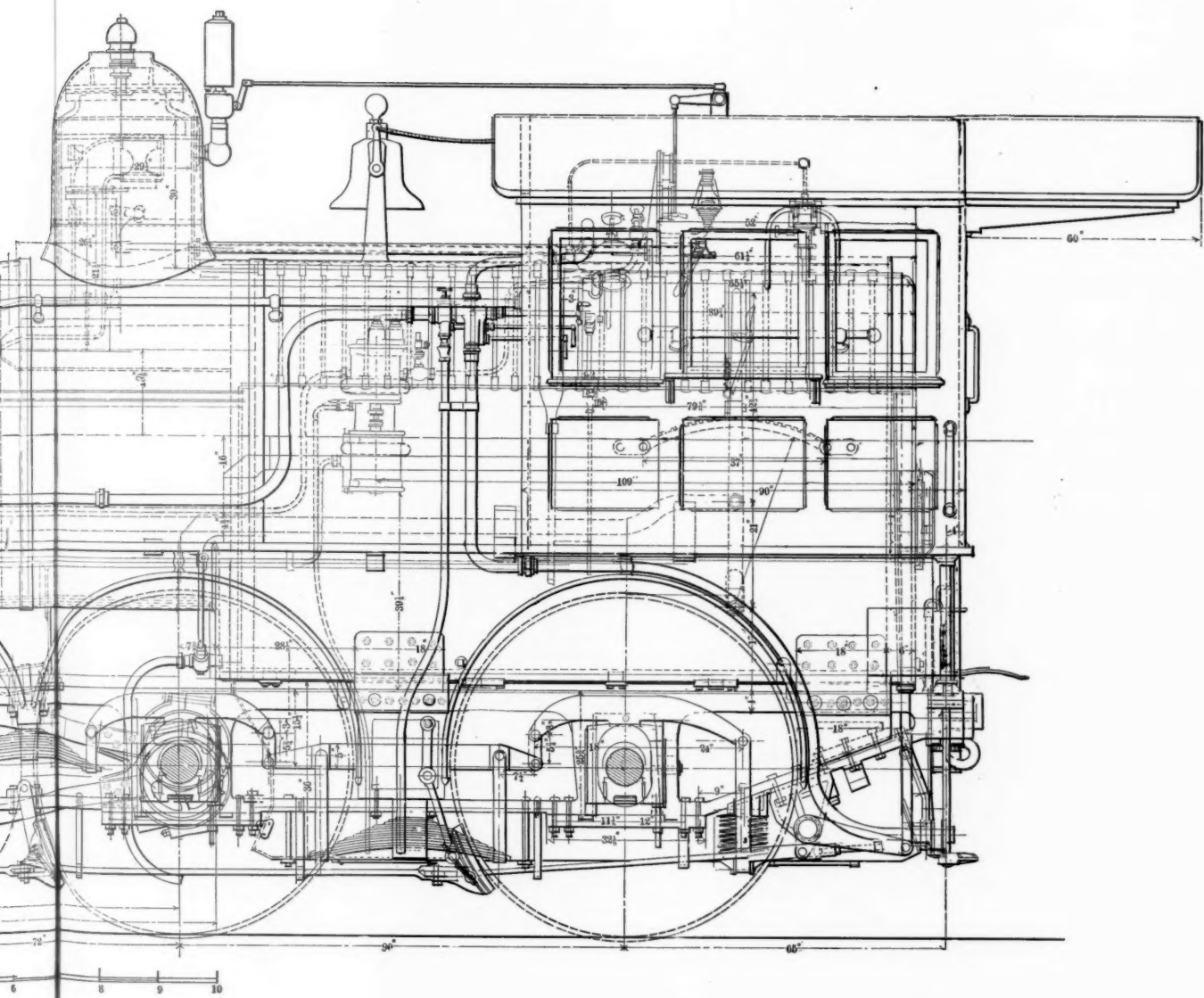
Blunders of Telegraph Operators.

The necessity of eternal vigilance, of constantly making thorough inspection which shall show how all grades of employes, on whom a railroad company relies for the safety of its trains, conduct their offices, was well illustrated by a recent collision of freight



TEN-WHEEL EXPRESS LOCOMOTIVE

Built by the BALDWIN LOCOMOTIVE WORKS for the New York, Lake



ESS LOCOMOTIVE.

the New York, Lake Erie & Western Railroad.



trains, in which two engines and 15 cars were wrecked, and which was caused by the blunder of a telegraph operator. The operator made one fatal mistake, and apparently two; but there were other loop-holes for errors, which indicate ways in which collisions may be guarded against in the future, if they did not directly contribute to this disaster. The circumstances were as follows:

D	C	B	A
West.			East.

Westbound train 39 was to meet eastbound first and second 18 at B and eastbound No. 24 at C. An order covering all these movements was sent to first and second 18 at C, to 24 at D and to 39 at A. The order was sent to the three offices at the same time and repeated back correctly, but the operator at C claims he understood that it was addressed to second 18 only and allowed first 18 to pass without delivering to it a copy of the order. It was night and there was no operator on duty at B.

If the operator at C had copied the addresses correctly the messages preserved by the trainmen would be evidence of the insincerity of his excuse, and we must therefore assume that the testimony of the other operators, who say that he repeated the order correctly, is reliable and that he repeated what he had not written down. But, whether this be the correct explanation or not, it is to be presumed that the dispatcher ordered him to prepare his manifold for five copies. If the dispatcher said five, as he should have done, the operator was careless at two points instead of one, as on the theory of his excuse he must have made only three copies. A requirement that operators should, in repeating, state how many copies they have made would perhaps be a safeguard at this point, although there is considerable reason in the view expressed by one critic of this case, that nothing but intense stupidity could have caused such a blunder. It is said that the operator has had considerable experience and has been regarded as a "reliable man." In addition to the two blunders already mentioned, he cleared his signal, which stands normally at danger, and allowed first 18 to pass as though no orders were on hand, which was in direct violation of the rule requiring a clearance card to be given under such circumstances. It is imaginable that, if he had stopped first 18, some intimation of the true situation might have occurred to the minds of some of the trainmen or of the operator, or that the collision would then have occurred at a more favorable place. "Not more than one specified movement should be included in an order." This message included two, and the sending of it in that form would be criticised by a strict officer, if he acted on the principle of the British government inspectors. They, in their investigations of train accidents, look sharply into all variations from strict compliance with rules, even if the errors are wholly unconnected with the cause of the accident that is being inquired about.

But, as above intimated, the main safeguard against this sort of carelessness—in fact, the only protection that can be satisfactorily applied—is in a general high standard of efficiency, which must be maintained among all operators alike, and which can be secured only by close and constant inspection. Moreover, this inspection must be aided by decoy movements if there can be found no other way to prove carelessness against an individual. The allowing of a train to pass without a clearance when orders are on hand can be fairly regarded as an index to the operator's general habits, and it may with reason be claimed that if he had been detected in such an act as this, and properly reprimanded or punished for it, he would have been much less likely to commit these other violations of rules. But the only way to find out if trains are thus permitted to pass is to make test cases, by putting detectives on the trains. This may be regarded as carrying "espionage" too far, and agitators among trainmen would quite likely bring up the subject in a lodge meeting and declaim against the "abuse" heaped upon the poor trainmen by an overbearing superintendent. It is true that one dereliction does not prove habitual bad methods, but it should prove enough to show the need of having inspectors and to put an inspector (if already in service) on the alert. It is very poor satisfaction to discharge a man after he has committed a blunder of this sort, and then fill his place with a new operator whose only superiority to the old one is his fair "record," which is very likely a short one and founded more on good fortune than upon intelligent, careful and long continued training. One plan of improving a force of men is by discharging those who are unsatisfactory and hiring new ones; another is to educate the present incumbents. Both have to be employed at times, but the latter is espe-

cially applicable to telegraph operators. They are generally younger and therefore more teachable than other classes; and, moreover, their work is characterized by such intricate details that a superintendent should desire, more particularly than with other classes, to have the satisfaction of having trained his men himself (on his own road).

Variations from the M. C. B. Standard Coupler Contour Lines.

Out of the ten different makes of vertical plane couplers exhibited at the Old Point Comfort Convention only four are built on the M. C. B. standard lines. The reason for this is not very clear. All the makers agree that they can make their devices to the standard contour and that they will couple in service when made on the standard lines, but they all say that their individual lines will couple better, not to speak of further advantages to result from the particular contour which they favor.

Now, while these claims are not without foundation when considered by themselves, they are all defective when the coupler is considered as a whole. Take, for instance, the large variation from the standard contour at the heel of the knuckle, where it bears against the guard arm of an opposing coupler. This variation exists in the majority of the couplers exhibited, and amounts to about $\frac{1}{8}$ of an inch in one instance. What is its value? Simply this; it will couple on a sharper curve than the M. C. B. standard, and the action of coupling is softer and less force is required to couple on a straight line. Now, there is a great disadvantage in this deviation, from the fact that the life of the coupler is materially reduced, particularly when it is applied to passenger service. When so made the wear on the inside faces, which is such an important factor in that service, will much sooner bring the couplers to a dangerous state, with a liability of uncoupling.

All other disadvantages aside, this is enough to prohibit for all time the use of such a contour. The limit of life of the knuckle in passenger service is found in the limit of wear of the interior face of the knuckle. Take, for instance, the experience of the Burlington since Jan. 1 of this year. We have in this office photographs of wrought-iron knuckles in perfect condition in every other way, but so worn on the inside face that they would not stay coupled on a curve, and the inside is so worn away that the coupling-pin hole is exposed for one-third of its diameter. The cost per year for knuckles on passenger car equipment, when the buffer springs are kept up to the strength intended, will be large, and it would be poor economy to use a contour that would decrease the life, such as would be the case where a small amount of wear would put the couplers in a condition that would require their removal.

A question now naturally arises regarding the difficulty of coupling with the M. C. B. standard contour when strictly adhered to. Regarding this, all know who have ever tested the couplers in service or laid out the lines on a drawing board that there is no difficulty in coupling with these lines on a 30 degree curve, and that, while it may require a slight blow to get a free movement of the knuckle to the locked position, yet that blow is not objectionable, and is not as great as required to couple the Miller hook, and not as great as is used in 90 per cent. of all of the couplings made. It is true that with a model less force is required to couple when the heel of the knuckle is reduced, and that the knuckle more naturally revolves into position; but of what use is an easier coupling when that obtained with the M. C. B. type is free enough? Would it be worth while to sacrifice a considerable length of life for a gain in freedom of action that is not called for or found to be necessary?

There is another side to all this claim for superior lines than that which appears on the surface. It is in the reduction of the weight and cost of the knuckles. When the makers of knuckles have settled the bills resulting from an attempt to oppose the standard lines, they will not find their departures to have been profitable or to be less expensive than to fill the knuckles out to the adopted lines.

The progressive spirit that leads to an improvement of the lines is commendable, and it is doing a good service to railroading to point out all of the good and bad features of the possible contours, but it is not good foresight or business tact to fight the inevitable, and that is what such a course amounts to in this case. This point will be more clearly seen by any one who will take the trouble to look carefully into the total effect of long-continued service on any proposed lines. Only one conclusion will be reached, and that is that the standard contour in all but one point is of such a shape as to reduce to a lower point the evil results of

wear than is the case with any other contour yet offered. The point to which exception is taken is the small wearing surface on the inner faces of the knuckles where the two knuckles touch each other. This point is the result of a necessity that seems to exist for making the knuckle as strong as possible at the base of the two lugs through which the coupling pin passes. This will be, probably, a necessity as long as the link slot is used, but as soon as that has disappeared the couplers can all be made with a flat, wide inside face, and yet couple with each other, and with those now in use, in a perfectly satisfactory manner.

What is wanted of new couplers put into the market is an increase of strength and durability. These are the needs developed by service. No call has been made for and no necessity has arisen for a change in the contour. Therefore, would it not better assist the advancement of the vertical plane type of coupler, and is it not better from a business standpoint, to build the couplers exactly to the lines as they are called for, and throw the responsibilities of failure on the Association in adopting such lines?

There is a strong opposition among some coupler manufacturers to the demand now made for exact adherence to the standard contour in all of its parts. This opposition is based on the argument that the members of the Association have changed their demands since the lines were adopted. It is said that the purpose of the lines was not to regulate the exact dimensions, but rather the action of coupling. It is stated further that all couplers were to be received which coupled with these lines. This position may have some basis in fact, but whatever may have been the original purpose, the developments of service have clearly shown the need of a strict adherence to the lines and a stringent regulation as to deviations therefrom. Some of these deviations have become so great that, while the couplers in question will couple with the lines, they will have but little durability and will be very likely to uncouple after a small amount of wear.

Our Accident Statistics.

Readers who examined the accident statistics reported by the statistician of the Interstate Commerce Commission at the convention at Washington, May 28, and printed in the *Railroad Gazette* of May 30, doubtless at once observed the marked difference, in nearly every particular, which exists between the basis on which those figures were made and that which has governed the *Railroad Gazette* train-accident record. This table which Professor Adams has made for the year ending June 30, 1889, is the first official record of the kind, giving details, which was ever published. For the previous year nothing but the totals were given.* This report is made for the simple purpose of getting at the total number of deaths and injuries to persons, while the primary object of the *Railroad Gazette* record has been to ascertain the number of accidents to trains. While protection to life and limb was and is a paramount reason for aiming to secure safety in railroad operations, the original plan for the compilation of our record was for an exhibit of the accidents themselves. The number of collisions, with discussion of means for their prevention; the number of derailments, with a study of the best means for improving track and rolling stock, have been presented month by month for these seventeen years on the theory that the prevention of the accidents was the only practicable prevention of the deaths and injuries.

Of the nine kinds of accidents to persons included in Professor Adams' table, only three are at all comparable with the *Railroad Gazette* figures. These are the deaths and injuries from collisions, derailments, and "other" train accidents. A glance at the figures set against the last of these classes at once shows that only the other two can be intelligently compared. "Other train accidents," as gathered by the commission, apparently must include a great many cases where the damage to rolling stock or permanent way was extremely slight, if, indeed, it does not cover cases of injury to persons where the cars and engines suffered no damage whatever. As is well known, our "other" accidents are chiefly burst boilers and cylinders and broken side rods, which constitute but a small class. If a brake-wheel should come off and throw a brakeman to the ground, causing his death, the accident might be classed as a "train accident," but many would class it as "falling from trains," and with equal reason. This is a sample of numerous differences which at once occur to any one studying the lists. That the reports sent to the Commission include many casualties resulting from other than train accidents is plainly evident from the statement of "other

	'88-'89.	'87-'88.
*Passengers killed.....	310	315
Passengers injured.....	2,146	2,138
Employes killed.....	1,372	2,070
Employes injured.....	20,025	26,145
Other persons killed.....	3,541	2,579
Other persons injured.....	4,135	3,602
Total persons killed.....	5,823	5,262
Total persons injured.....	26,300	25,888

The figures for 1888 are for 93 per cent. of the mileage of the country. Assuming the same ratio for the other 7 per cent., the totals for that year would be 5,693 killed and 27,898 injured.

persons" killed, which is as follows: By collisions, 37; by derailments, 29; by other accidents, 522. Evidently every tramp run over by a train in the United States has been honored by calling his death a "train accident."

A comparison of collisions and derailments, where there is less chance for difference of construction as to the meaning of words, shows a closer correspondence between the two records than we had expected to see. The number of persons killed in the year ending June 30, 1889, was as follows:

EMPLOYEES.	Official report.	Railroad Gazette report.
Collisions.....	167	178
Derailments.....	125	163
Total.....	292	336
PASSENGERS.		
Collisions.....	107	95
Derailments.....	58	59
Total.....	135	154
OTHER PERSONS.		
Collisions.....	37	41
Derailments.....	29	25
Total.....	66	66

The record of passengers killed, which is the one most likely to be correctly compiled from newspaper accounts, and which is one of the best features of the report for judging of the comparative safety with which a railroad is operated, shows our record to correspond very closely to that of the Interstate Commerce Commission. Of the 59 passengers killed in derailments, as reported in our columns, 23 were the victims of the Johnstown flood, and were classed by the Interstate Commerce Commission under "other accidents." The total number of passengers reported by us as killed in these two principal classes (154) is therefore seen to be only four less than that shown by the official record.

We do not compare the record of non-fatal injuries, as neither record affords a very satisfactory basis for comparisons. If railroads would tell how much money they pay out for damages for injuries to passengers, the aggregate of personal injuries in different years or different territory might be instructively compared, but as long as nine serious injuries and one slight one count the same as nine slight and one serious nothing satisfactory can be deduced.

For the purpose for which our record is avowedly made its accuracy is therefore more fully confirmed than was to be expected. Ninety-five per cent. of the cases which presumably all got into print (fatal injuries to passengers) is a very respectable percentage. Of accidents to employes, which occur more largely on freight trains, and which often do not get into the newspapers at all, the records show that we have published an equally creditable percentage of all we aimed to publish. Where we recorded more deaths in a certain class than are reported to the Commission, the discrepancy is to be accounted for by the different names given to various kinds of accidents. "Collision" is used in our record for all cases of cars or engines injuriously bumping each other; but many railroad officers apply some other name to crossing collisions, slight mishaps in yards, etc. "Derailments," as used by us, is necessarily an arbitrary term; accidents from defective bridges, landslides and some other causes are probably often called by railroad officers something else.

One of our contemporaries expected that the *Railroad Gazette* record would be found to contain only 40 per cent. of the casualties to persons from train accidents actually occurring in the country; and, by including the deaths and injuries to "other" persons from "other" accidents, without giving the obvious explanations indicated above, succeeded in satisfying its expectations, and informs its readers that our record has failed to catch more than one-twelfth of the 32,132 casualties reported by the commission. Inasmuch as about 29,000 of the 32,000 belong to classes which we made no attempt to "catch," the comparison is characteristically hasty and misleading.

Our contemporary makes comparisons between English and American accidents, and is obliged to conclude that the returns for the United States include many accidents from trains as well as to trains, but does not state that this conclusion, in the fourth column, vitiates its comparisons with the *Railroad Gazette* records (in the first column). The records for the United States, as gathered by the *Railroad Gazette*, and of Great Britain, as reported by the Board of Trade, for the calendar year 1889, shows the following:

	Employés Killed.	Employés Injured.	Passen- gers Killed.	Passen- gers Injured.
UNITED STATES.				
Collisions.....	170	515	42	212
Derailments.....	151	42	66	494
Other Train Accidents.....	12	21	..	9
Total.....	333	978	108	745
UNITED KINGDOM.				
Collisions.....	3	19	86	582
Derailments.....	..	11	1	231
Other Train Accidents.....	1	19	1	203
Total.....	4	119	88	1,016

The train mileage of the United States is about 2½ times greater than that of Great Britain and the mileage of road about eight times greater. The various considerations affecting a comparison of the records of the two countries necessitate, however, so many important exceptions, provisos and explanations that, as stated in the *Railroad Gazette*, of March 28 last, the figures can not be depended upon for important lessons. The official figures of the Interstate Commerce Commission do

not alter our conclusions; and a glance at the comparisons just set forth shows that if one would boast he must do it with "discrimination." Our contemporary also "throws out" the Armagh collision as "exceptional," and makes further comparisons of English and American railroading. Why that accident should be thrown out of the British returns, while the Johnstown and Thaxton's accidents in this country are not also eliminated does not appear. The Armagh collision, although very much worse than any other railroad accident in Great Britain for several years, and the only great horror happening there since the Tay bridge, in 1879 (unless we include the Hexthorpe collision of 1887), was really a rational result of English methods of train management. The essential cause was the absence of brakes on passenger cars, a practice as vicious and as disgraceful to English railroad management as the neglect of block signaling and of track watching are in America. A fairer basis of comparison would be, What is being done in the respective countries to prevent similar accidents in future? Since the Armagh disaster the English roads have been ordered by the government to provide continuous automatic power brakes for every passenger train, and block signals for all lines of road carrying passengers; so that, however bad their record may be for 1889, there is a reasonable prospect that it will show decided improvement in each succeeding year. On the other hand, the causes which led to seven of the eight principal accidents in this country in 1889 are about as likely to cause two score deaths of passengers in 1891 as they were in 1889. We killed over 300 employes in collisions and derailments in 1889, and we fear that we shall kill as many more in 1890. England killed so few trainmen in train accidents as to present almost a clean record, but she seems to have killed more men *per train mile* in coupling cars than we did; and she continues her old-fashioned couplings, while we have begun to reform. With her low cars only 51 men were killed by falling through trains, while 493 American trainmen died from this cause. In this also we have made good progress toward mending our ways.

Annual Report.

St. Louis, Alton & Terre Haute.—The lines of this company are divided into two parts: one which it owns and does not operate, the other which it operates but (mostly) does not own. The results on the lines operated are as follows:

	1889.	1888.
Miles operated.....	230	203
Earnings passenger.....	\$200,953	\$170,479
Freight (and coal).....	850,638	697,607
Total, including miscellaneous.....	1,110,426	919,397
Operating expenses and Taxes.....	648,673	548,511
Net earnings.....	461,748	400,786
Rentals.....	332,635	249,936
Net results for year.....	\$129,633	\$150,860

To this net result is to be added \$450,000 received as rentals, out of which available revenue was paid \$469,000 interest and \$94,000 for betterments, back taxes, etc., leaving a surplus for the year of \$19,304.

	1889.	1888.
Tons carried, coal.....	780,253	695,312
" other freight.....	594,389	498,143
Ton mileage coal.....	27,868,000	25,533,000
" other freight.....	44,251,864	30,097,009
Receipts per ton-mile, coal.....	cents 1.056	1.061
" other freight.....	" 1.257	1.418
Passengers carried.....	296,014	267,700
Passenger mileage.....	7,391,000	6,669,000
Receipts per passenger mile.....	cents 2.55	2.56

The increase in the mileage makes detailed comparison with previous years unavailable. It is worth notice that while the gross earnings are larger than in any previous year of the company's history, the net return is smaller than it has been since 1876, when the system was only one-third as large as it now is.

The detailed reports of the drawbridge disaster at Oakland, Cal., on May 30, confirm the account published in our last issue. There were no interlocked signals of any kind, and the small hand flag which was customarily stuck up between the rails on the fixed span was obscured from the view of the engineer by the trusses of the bridge until he got within 140 ft. of it. The Southern Pacific has several other drawbridges in the vicinity well protected, and there seems to be much justice in the statement of a San Francisco paper that this bridge, being on the South Pacific Coast Division, which was purchased from Senator Fair a few years ago, is still operated on the "economical principles" which obtained on that road when it was a struggling competitor. From the direction in which the ill-fated train approached there was a clear view of the bridge for 3,000 ft., the curve referred to in the reports being not around buildings or other high obstructions, but on the edge of a body of water. The curve turned to the left, but the engine was running backward, so that this was favorable to the engineer rather than otherwise. The engineer applied the brakes some distance before reaching the bridge and let them off again, so that he was not completely absent-minded. When he first realized his danger he was going about 15 miles an hour, according to the fireman's testimony, and had reduced the speed to probably less than four miles an hour before going off the ends of the rails. His blunder appears to be as simple and as inexcusable as an errand boy's. Apparently he "didn't think." The only difference is that here the consequence

was a terrible tragedy. There is no report of any suspicion that the man was under the influence of liquor. The local newspapers take very intelligent views of the disaster and its remedy. One of the San Francisco papers demands that trains approaching a drawbridge be held one station back whenever the draw is open. This view may seem somewhat extravagant and the requirement unnecessary, but it has the endorsement of no less an authority than the British Board of Trade of one of the inspectors of that body having laid down the same rule in the case of a grade crossing collision on the London Underground road a year or so ago. The New York papers exhibit their usual wisdom. One of them says that at all drawbridges in the vicinity of New York trains invariably come to a full stop! Another one says that a full stop should always be required. While we cannot pretend to count up the drawbridges near New York, passing hundreds of trains daily, which are provided with interlocking signals, and at which trains do not stop, we would call the reporter's attention to the single instance of the Pennsylvania bridge over the Hackensack River between Jersey City and Newark. At this bridge trains not only omit the formality of a stop, but they habitually run at very high speed. Quite likely the reporter was deceived by this fact; the train he was on doubtless crossed the bridge so quickly that he thought himself continuously on terra firma.

A bill revising the laws providing for the abolition of highway grade crossings in Massachusetts, which has been under discussion for several days in the Legislature of that state, seems to have been finally passed, and in a shape which promises definite improvement in the relations between the railroads and the municipalities on this question. Although Massachusetts is one of the most progressive states in this matter, both as regards public sentiment and the statutes for facilitating changes, nearly every important crossing that has been changed in that state, as elsewhere, has been the subject of tedious investigation, conference and delay. The usual disagreements concerning the apportionment of the expense have been appealed from one tribunal to another, so that anything like prompt action has been almost unheard of. Generally speaking, the only way for a railroad to get a crossing promptly abolished was to pay substantially all of the expense itself. As summarized in the telegraphic dispatches, the chief advance made possible by the new law lies in the absolute assumption by the state of a portion of the expense (25 per cent. or more in each case) and in the permission given to the municipalities or the railroads to get a commission appointed by the Superior Court to consider the merits of any specified case and to apportion the cost. Heretofore there has been much delay by the refusal of towns or cities and railroads to co-operate with each other in demanding a change. The new bill stipulates that in every case the railroad must pay 65 per cent. of the cost and that the remaining 35 per cent. is to be divided between the state and the town, the share of the latter, however, to be not more than 10 per cent. Of course, no such arbitrary measure will work a summary remedy in cases involving large conflicting interests, unless the Act shuts off all appeal, which is not probable; but the assumption by the state of a fourth of the cost will be a potent lubricant in many cases that have heretofore been regarded as unsolvable. The state is not to spend over \$1,000,000 annually.

The statement is published in numerous newspapers, with considerable comment, that the Canadian Pacific has never lost the life of a single passenger, and a railroad newspaper has apparently verified it to the extent of getting a letter from an officer of the road stating that the "only person ever meeting death while a passenger on the Canadian Pacific" was a little girl who attempted to disembark from a train when it was standing on a bridge. The road has been open about nine years. From the records available the passenger mileage for the past six years appears to be 984,718,000, equal to 164,119,000 annually. If the record of all passengers suffering from their own want of caution, as well as from circumstances partly or wholly chargeable to the railroad employes, has been taken into account, this is indeed a remarkable showing. This road uses the block system for passenger trains.

We have received from Mr. F. W. Webb, Mechanical Superintendent of the London & Northwestern Railway, photographs of the general drawings and elevations of the compound passenger engines with 7-ft. drivers recently put into use on that road. The photographs are exceptionally clear, and the drawings so nicely made that even with the large reduction, the dimensions can be easily read. These engines have three cylinders on the Webb principle, the low pressure 30 in. in diameter, and the two high pressure 14 in. in diameter, all 24-in. stroke. The name of the engine from which the photograph was taken is the Jeanie Deans. The boiler heating surface is as follows:

Tubes, 1,242 sq. ft.; fire box, 150 sq. ft.; total, 1,402 sq. ft. Grate area, 20.5 sq. ft. The boiler contains 225 tubes 1½ in. outside diameter.

Not long since the Baldwin Locomotive Works built for the Baltimore & Ohio Railroad a 10-wheeled express locomotive having 21 × 26 in. cylinders under a guarantee

to haul seven passenger cars up a 117 ft. grade 17 miles long at 25 miles per hour. This engine has been put in service and has more than met the guarantee; it hauls readily eight cars up the grade mentioned. At that speed and up that grade the engine is performing over 1,300 H. P. of work, considering the total train load to be 440 tons. The weight on drivers is 102,000 lbs. The total weight is 133,000 lbs.

The Interstate Commerce Commission has sent to the United States Senate its report on the effect of the Short Haul Clause upon the price of food products. The abstract furnished the newspapers is not very clear. It appears, however, that the Commission justifies the railroads in making rates to develop volume of business rather than on any other ground, but believes that, judged on this basis, grain rates west of Chicago are, as a rule, too high for short and long distances. It holds that wheat and flour should bear the same rate, and that this should be not more than 15 per cent. higher than the rate for corn and oats. Other grains should take the same rates as corn.

NEW PUBLICATIONS.

The Development of the Philosophy of the Steam Engine. An Historical Sketch. By R. H. Thurston. John Wiley & Sons, New York.

This little book is a reprint, with some modifications and additions, of a paper read by the author before the British Association for the Advancement of Science in 1884. The history of the growth of the theory of the steam engine is followed through and is divided by Prof. Thurston into three periods, as follows:

(1) Primary Period—That of incomplete investigation and of earliest systematic but inaccurate theory.
(2) Secondary Period—That of the establishment of a correct thermodynamic theory, the *Theory of the Ideal Engine*.

(3) Tertiary Period—That of the production of the complete theory of the engine, of the true *Theory of the Real Engine*.

This small book is one which all who are interested in steam engineering will find entertaining, and which should be read especially by the practical engineers who have not the time or the inclination to study the work of Rankine, Clausius, Hirn and others in detail.

The Western Engineer is a monthly periodical devoted to mechanical, steam and hydraulic engineering. It is published by the Pond Engineering Co., with offices at St. Louis, Kansas City, Chicago and Omaha. Four numbers have been issued, which contain several good articles on engineering subjects.

Hand-Book of Passenger Traffic and Accounts. By M. M. Kirkman, Chicago. Price, \$2.

This work, which is a summary of Mr. Kirkman's years of study and practice on the subject, and was referred to in the *Railroad Gazette* of May 9, has just appeared. The appendix contains 27 forms of blanks used by agents, conductors and others in this department.

The Master Car Builders' Convention.

(Continued from page 417.)

by starting fires in stoves. The only road reporting independent cars for heating trains is the Chicago, Milwaukee & St. Paul. Two such cars are in service on this road, and are furnishing steam heat for the train and operating the electric light. When steam is furnished for both heat and electric light, it is believed that it costs no more to haul the extra car than it does to furnish steam from the locomotive.

No special means of ventilation is in general use. The Chicago, Milwaukee & St. Paul uses on some cars a boxed steam coil at the end of the cars, through which air is forced by the Spear Heater attachments used in connection with the stove for this purpose, and the improvement as to the condition of the air is very decided. As to failures, all reports concur in claiming that none occur if all points are properly cared for by the attendants.

Comparatively few replies were received, heating being in a transition state. The rest of the information is summarized in the accompanying table.

J. N. Barr, T. A. Bissell, J. W. Marden, J. C. Barber, W. H. Lewis, Committee.

After some desultory talk about couplings and standards for parts, and a decided expression from Mr. Barr that we are not ready for standards, but need more information about failures, etc., the committee was continued another year.

REPORT ON CODE OF RULES FOR INTERCHANGE OF PASSENGER TRAIN CARS.

The committee finds that there are generally special agreements between roads for the interchange of sleeping, parlor and private cars and, therefore, concludes that rules for general adoption would have but a limited application. A few rules governing the height of drawbar (on which another committee is at work), the condition of the trucks, wheels and brakes, which are the vital points in the safe handling of cars are, however, recommended. These, if adopted, would reduce to a minimum the difficulties encountered in the interchange of passenger equipment, and as such interchange increases the rules could be enlarged. The present rules governing the interchange of freight cars will very largely prevail in the interchange of passenger equipment, in so far as the general repairs to such portions of the cars as do not affect the safe running of same are concerned.

In considering this subject, your committee did not deem it advisable to recommend the use of a "defect card," but would recommend that authority be given in the same way as heretofore. This point was discussed at length by the committee, and we do not see

TABULATED INFORMATION ON STEAM HEATING.

NAME OF ROAD.	System used.	Direct or indirect.	No. of cars.	No. of months in use.	Largest trains.	Average time to heat up cars.	Pressure in pounds.	Pipes.			Outside temperature.		Temperature in car.	Time and pressure to effect circulation, indirect.		Noticeable effect on locomotives.
								Diameter.	Length.	Radiating surface.	Average.	Lowest.		Time.	Pressure.	
Baltimore & Ohio	B. & O. No. 1.		77	18	6	Min. 60	Lbs. 15	In. 2	Ft. 138	Ft. 138	Deg. 10	Deg. 70	Dg. 70	Min. 17	Lbs. 35	None.
	" " 2.		11	12												
	" " 3.		3	12												
	Martin		4	16												
	Westinghouse	D	3	5												
	Return		1	3	15											
Lehigh Valley	McElroy	I	3	6												
	Martin	I	3	6												
	N. Y. Safety	I	3	6												
	Consolidated	D	240		14	25	25	2	250		28 to 30	60 to 70	40 to 60			Little if any.
Union Pacific	Martin	D	33	4	3	45	5 to 10	2		185	-10					Little if any.
N. Y., L. E. & W.	N. Y., L. E. & W.	D	529		14	45						-8	70			
	N. Y. Safety	I	40				15									
	Martin	I	1				40									
	McElroy	I	1				40									
Lake Shore & M.S.	Martin	D	138		15	15	15	2	200				70			No data.
	McElroy	I	17			60	40	1 1/4	380					45		
Del. & H. Canal	McElroy	I	124	36	12	60	20	1 1/4	333	146	0	-42	65	10		None.
	Consolidated	D	Some													
Central Vermont	Consolidated	D	16	21	8	30	15	1 1/2		150	45	-25	70			None.
Illinois & St. Louis	Timlin - Heidinger	D	20	36	6	30	3	1 1/4	300		32	-5	70			None.
	Consolidated	D	158		6	60	5			193		-45	70			
Chic., Mil. & St. P.	C., M. & St. Paul	D	158		6	60	5			193		-45	70			
	N. Y. Safety	I	3													
Wisconsin Central	Martin	D	10	12	5	25	5	2		170		-25	70			None.
Wagner P. Car Co.	McElroy	I	252	24		25	10	1 1/4		130	10	-15	45	15 to 20		
	N. Y. Safety	I	23	6		45	30	1 1/4		160			70			
Fitchburg	Consolidated	D	228	36	13	10 to 30	15	1 1/2	350	150			70	15 to 30		None.

that anything better could be adopted covering this point.

We do not consider that a slid spot 2 1/2 in. long would be the proper thing for adoption in the interchange of passenger equipment; hence a different recommendation in the length of these spots. Three-fourths (3/4) inches as the minimum thickness of the flange on a steel tired wheel was agreed upon, after due discussion and inquiry into the present practices of various roads, in order to have an ample factor of safety to resist all thrusts of the wheel.

We find the practice as regards the minimum thickness at which the steel tire on a wheel can be run safely, varies considerably in different localities and in the different seasons; hence it was not thought advisable by the committee to recommend anything less than 1 1/2 in. as the thickness of tire at which a steel tired wheel should be rejected.

Special, sleeping and baggage cars, used in interchange traffic, should be equipped with a tool box containing four brasses, a set of brakeheads and shoes, one or two pedestals and an equal number of oil boxes. A printed list of supplies carried in the box should be secured to same in such a place as to be easily seen by parties having occasion to use such materials; and foreign roads using them should furnish authority to owners to render bill.

Inasmuch as the last convention adopted 70 lbs. as the initial pressure to be used on air brakes of freight car equipment, it was thought advisable to recommend that the same be used on passenger equipment, and that all brake adjustment of cars be based on the weight of car and 70 lbs. initial pressure. The matter of equalization and uniformity in this direction is one of the greatest importance, and the committee desires to call the special attention of the members to this point.

We have no recommendations to make as regards the subscribing of members to these rules, which we consider should be printed and added to the freight car code as an appendix.

Code of Rules—(Abbreviated).

1. Each company shall give to foreign cars the same care that it gives its own cars, except in case where work is done under special agreement. . . .
4. Authority must be furnished for the replacement of wheels and axles if in the following condition:

Wheels.—(a) Loose wheels. (b) Variation from gauge as indicated by fig. 1.

Wheels, cast iron.—(a) Shelled out, with treads defective on account of circular pieces shelling out, leaving round flat spots deepest at the edges, with raised centres, if 1 1/2 in. or more in diameter. (b) Tread worn hollow; if tread is worn sufficiently hollow to render flange or rim liable to breakage. (c) Worn flange; flanges having flat vertical surfaces extending more than 3/4 in. from tread. (d) Flat spots; if flat spots caused by sliding exceed 1 1/2 in. in length. (e) Burst; if wheels are cracked from the wheel-fit outward by pressure from the axle. (f) Flanges, rim, tread, plate or brackets, either cracked, clipped or broken in any manner.

Wheels, steel tired.—(a) Loose, broken or cracked hubs, plates, bolts, retaining ring or tire.

(b) Worn flange or tire, with flanges less than 3/4 in. thick, or having flat, vertical surfaces extending more than 3/4 in. from tread, or with tire less than 1 1/2 in. in thickness, measured at a point against the outside plate of the wheel.

* The illustration shows that cars may be refused if their wheels measure less than 4 ft. 5 in., or more than 4 ft. 5 1/4 in. apart (inside to inside of wheel) or less than 5 ft. 4 in. from outside to outside of treads.

(c) Flat spots, if flat spots caused by sliding exceed 1 1/2 in. in length.

Axles.—Axles bent or broken, or having journals cut or less than 3 1/2 in. diameter.

5. Brakes must be in perfect working order (adjustment based on 70 lbs. as the initial pressure) with a piston travel of not less than 6 in. nor more than 10 in.

6. Bills for wheels and axles must make specific mention of each wheel and axle removed or applied, and must show date and place changed, initial, kind and number of car; name of maker, date cast, number, cause of removal and shop marks on wheels and axles for those removed; for wheels or axles applied, name of maker date cast, number, whether new or second-hand, net charge for material and charge for labor.

Bills rendered shall be in accordance with the following prices:

	New.	2d hand.	Scrap.
One 36-inch cast wheel	\$14.00	\$10.00	\$5.50
One 33-inch cast wheel	12.00	7.00	4.50

	New.	Credit for scrap.
Journal bearings	29	10
Malleable iron	5	1 1/2
Bolts, nuts, wrought washers and all wrought iron except axles	5	1
Castings	2	3/4
Spring steel	3	3/4
Oak	3	3/4
Pine	3	3/4
Labor	25c. per hour.	

All steel castings and steel wheels of the different makes to be charged at current market prices. Removing, turning and replacing a pair of steel-tired wheels, \$7. Removing and replacing a pair of cast iron wheels, \$2. Loss of service metal from steel tired wheels as a result of slid spots or other causes, to be charged at the rate of \$2 per 1/2 in. thickness of tire. Glass, paints and other material to be charged at current market prices.

C. A. SCHROYER, J. H. RANKIN,
R. KELLIS, J. B. HENNEY, } Committee.
T. SUTHERLAND,

DISCUSSION.

After discussion by Messrs. Barr, Chamberlain, Adams and Rhodes, the first three clauses were adopted as recommended by the committee. The fourth was discussed at great length by Messrs. Barr, Schroyer, Adams, Chamberlain, Bissell, Forsyth and Rhodes. Several motions were made and lost, but the clause was finally accepted as presented. Clause b, regarding steel tired wheels, was then reconsidered on motion by Messrs. Adams and Rhodes, and made to read "or with tire less than 1 in. in thickness," the expression "measuring at a point against the outside plate of the wheel" being removed.

The fifth and sixth clauses were accepted. The seventh clause was carried after a change in the price of chilled 33-in. wheels to \$10 each, instead of \$12. It was then voted that these rules be appended to the regular rules of interchange.

Adjourned to Wednesday morning at 10 o'clock.

WEDNESDAY.

The session of Wednesday was devoted to a discussion of the Rules of Interchange, Mr. Schroyer in the chair. The rules were read item by item and there was much careful discussion, and some changes were made. The

Arbitration Committee had prepared a good report embodying several of the recommendations made by the Western Railway Club and the Central Railway Club. The changes adopted follow.

Rule 3, section (b), to read: "Seams 1 in. long or over at a distance of $\frac{1}{4}$ in. or less from the throat of the flange, or seams 3 or more inches long on any other point of the tread."

Section (c). Strike out the words "or diameter" to read "worn through chill; when the flat spot extends $2\frac{1}{2}$ in. in length," etc.

Section (p) changed in the limit of the centre of the axle under 50,000-lb. cars, from $4\frac{1}{4}$ in. to $4\frac{1}{2}$ in.

It was proposed to add a section to be lettered *r* to refuse cars with "journal box lids missing or broken." On this proposition there was an animated discussion. Messrs. Kirby, Chamberlain, Day, Peck and Adams opposed the rule. Messrs. Casanave and McKenzie spoke in favor of it. The argument against it was that it would delay traffic. The proposition was defeated, the vote for it being quite small.

Section (s), paragraph 9, amended to read "Brake beams, levers and attachments less than $2\frac{1}{2}$ ins. from the top of the rail."

Rule 4. Mr. Casanave called the attention of the convention to the fact that inspectors often refuse cars that are safe to run, contrary to this rule. No action was asked for or taken other than to call attention to the matter.

Rule 5. The committee called attention to a number of cases in which the defect cards were not made out in accordance with Rule No. 5. In some cases they were only filled in one side, and in others the defects were noted in an abbreviated form. The attention of the members of the association should be called to the fact that unless an M. C. B. defect card is made out strictly according to the provisions of Rule No. 5, it cannot be considered a proper voucher for the cost of the repairs made on authority of such card. This matter was considerably discussed by Messrs. Casanave, Verbryck, Chamberlain, Wall, Barr, Marden, Day and Lewis. On motion of Mr. Barr an item was added to the rule to the effect that the card must plainly specify each item for which charges are authorized, and on motion of Mr. Wall it was provided that one end of the card must bear the name and address of the officer who must audit the bill.

Rule 6 was discussed at some length, but was not changed. The rule authorizes repairs to a car bearing a defect card "provided such repairs are necessary for the safe running of the car." It was moved to strike out this proviso, but the motion was lost, largely on the ground that there should be no greater opportunity than now exists for repairing other people's cars and collecting bills for such work.

Rule No. 8. In addition to the locks on cars which are stated in this rule to be at the owner's risk, the committee would recommend to the association that it consider whether it would not be proper to add "grain doors," to be also at owner's risk. It was voted to add the words "and grain doors" to this rule, and also to sustain a decision of the Arbitration Committee in case No. 20, in which the committee ruled that grain doors could not be subject to inspection, and could not be treated as permanent parts of cars, it being impossible to know their state in loaded cars.

Rule 9, Section (c) of the paragraph relating to axles changed and chargeable to the company owning the car: This clause reads, "Axles less than the prescribed limits." The committee recommended a change to make the clause read as follows: "Axles less than the prescribed limits of the wearing parts." The object of the committee in recommending this change is to place the responsibility for the replacement of an axle too small in the centre upon the road accepting such car through faulty inspection, as under the present rule the owner of the car is chargeable with the replacement of the axle for the defect named. This was discussed at length. Mr. Barr moved that it be made to cover *journals* less than the prescribed limits. This motion was carried, but reconsidered. Then Mr. Barr moved that Section (c) be stricken out, but this motion was laid on the table.

Rule 10. This is the rule providing for the repair of cars belonging to private companies. The committee recommended a change in the last paragraph to read as follows: "Railroad companies doing work on individual cars for which the owners are responsible shall in all cases add 10 per cent. to both labor and material, to the schedule of prices fixed in Rules Nos. 12 and 25." The paragraph was after some discussion amended to read: add 10 per cent. to the prices scheduled in Rule 25; the prices for wheel and axle work as scheduled in Rule 12 not to be augmented.

Rule No. 11. The committee recommends that this rule be changed to read as follows: "A car unsafe to load on account of general worn-out condition, due to age or decay, shall be reported to its owner, who must be advised of all existing defects. If the owner elects to have it sent home, he shall furnish two home cards, noting upon them existing defects and the route over which the car is to be returned to its owner, etc." This was adopted.

Rule 12. An effort was made to so amend this rule as to prevent an owner who repairs his own car, putting in new wheels in place of serviceable second-hand ones, from charging the full value of the betterment to the company carding the car. This was defeated.

Rule No. 15. The Western and Central Railway

Clubs recommended the addition of a rule, to be numbered 16, to follow Rule No. 15, as follows: "In repairing damaged cars, M. C. B. standards may be used when of design and dimensions that do not mar or impair the strength of the cars, in lieu of the parts forming its original construction." The members of the committee were divided in their opinion, and presented the subject to the association without any recommendation. There was some opposition to the new rule, but Mr. Rhodes made a good speech in its favor and it was carried unanimously. Mr. Rhodes argued that the association can only establish its standards and maintain them by constant endeavor. Not to adopt the proposed rule now would be simply to put off what is sure to come. He thinks that there will be a permanent committee on standards charged with the duty of watching any neglect of or encroachment upon the standards of the association.

Rule 17. On motion of Mr. Barr, it was voted to add the provision that two adjacent sills on the same end of the car cannot be spliced.

Rule No. 20. The committee recommended a change, to read as follows: "The company on whose line the bodies or trucks are destroyed shall report the fact to the owner not later than 30 days after their destruction, and shall have its option whether to rebuild or settle for the same." Adopted.

Rule 22 was changed to provide that \$50 per car for air brakes shall not be subject to depreciation.

Rule 23 changed by the addition of the words "accompanied by a defect card" after the words "put in good order."

Rule 27 was amended by striking out all that follows the words "delivering the car upon such track." This places the settlement for cars damaged on private tracks unqualifiedly upon the railroad company delivering them to such track.

EXHIBITS.

Michigan Railway Supply Co., Detroit, Mich., model of the Central steel brake beam and a corrugated grain door.

B. E. Tilden, Cleveland, O., wrecking frog.

Goelet Automatic Car Coupler & Manufacturing Co., New Orleans, La., model of a link and pin coupler.

Stanley G. Flagg & Co., Philadelphia, samples of their malleable cast iron and steel pipe fittings for car heating and brake equipment.

Peerless Rubber Manufacturing Co., New York, samples of hose for air brakes and car heating.

Standard Paint Co., New York, samples of building and insulating paper.

John C. Wands, St. Louis, models of Wand's car door clamp lock and the "Economy" car door.

Anchor Iron Car Roofing Co., St. Louis, model of iron car roofing.

National Lock Washer Co., Newark, N. J., samples of nut locks and washers.

Elmore Box Lid Co., Chicago, models of box lids.

Union Feed Water Heater & Purifier Co., Chicago, feed water purifier.

W. W. Townsend, Jr., Minneapolis, Minn., full size Townsend automatic car coupler.

Gould Coupler Co., Buffalo, N. Y., full size Gould automatic car coupler.

DeLong & French, New York, samples of hair felt.

Johnston Electric Train Signal Co., Boston, complete working model of the Johnston electric train signal. This is the only electrical device exhibited, and attracts great attention.

Timms Automatic Car Coupler Co., Columbus, O., models of coupler.

F. W. Bird & Son, East Walpole, Mass., samples of waterproof papers and the Neponset car roofing.

Capital Mfg. Co., Chicago, samples of the Acme wrench.

E. N. Jones, St. John, N. B., the Jones coupler (Miller type).

Jull Mfg. Co., Brooklyn, N. Y., photographs of the Jull centrifugal snow excavator at work in heavy snow drifts on the Union Pacific.

Wood Extensible Air Car Step Co., Wilmington, Del., working model of step.

Vose & Cliff Mfg. Co., New York, samples of King's yielding side bearing for cars.

Erie Car Heating Co., Erie, Pa., model of car heating apparatus.

Frazier & Moore, Zanesville, O., model of link and pin coupler.

Watson Automatic Coupler Co., Paterson, N. J., model of car coupler.

Davis Spring Plate Co., Wilmington, Del., samples of bolster spring plates.

Transcontinental Car Lock & Seal Co., Chicago, samples of the Davis car lock and seal.

Buda Foundry & Manufacturing Co., Buda, Ill., hand and push cars.

Cooke Railway Supply Co., Chicago, sample of Cooke's wrecking frog and portable car replacer.

Eureka Nut Lock Manufacturing Co., Marshall, Texas, samples of nut lock.

Emil Fisher, Baltimore, Md., samples of car plush renovated by his cleaning process.

Mason Regulator Co., Boston, samples of air brake regulator, the Mason reducing valve and damper regulator.

International Mfg. Association, New York, samples of deck sash opening appliances.

Anthony & McElroy, Philadelphia, samples of hexa-

gonal turnbuckles manufactured by the Central Iron & Steel Co., of Brazil, Ind.

A. L. Wilkinson, Richmond, samples of car sash holder.

Hartford Woven Wire Mattress Co., Hartford, Conn., car seats and steel wire mats.

Knitted Mattress Co., Canton, Mass., samples of knitted fabrics for stuffing car seats and backs, to take the place of curled hair.

Paul Reeves, Philadelphia, samples of car journal bearings.

Nichol Lubricator Co., of New York, samples of the Nichol gravity lubricator.

Hinson Car Coupler Co., Chicago, full size Hinson M. C. B. coupler.

Hinson Drawbar Attachment Co., Chicago, full size drawbar attachment.

Industrial Light Co., New York, samples of the Lucigen light.

Milwaukee Car Wheel Co., Milwaukee, Wis., a broken wheel showing the action of the Barr contracting chill.

A. French Spring Co., Pittsburgh, Pa., samples of springs and the Morris box lid.

Fontaine Safety Signal Co., of Detroit, Mich., Fontaine safety signal.

J. R. Hosier, Hampton, Va., sample of self-oiling lubricator.

Fowler Rolled Steel Car Wheel Co., Chicago, samples of the Fowler rolled steel car wheel, in four sizes, 30, 33, 36 and 42 in.; exhibited by Henry S. Fowler.

Edward E. Gold & Co., of New York, samples of coils and couplings and blue prints of the Gold car heating system.

Martin Anti-Fire Car Heater Co., Dunkirk, N. Y., new automatic coupling for car heating and the De Kalb ventilating car window. An ingenious device is shown for placing the hose couplings in position in hose in such a manner as not to injure the packing.

Fairbanks & Co., of New York, samples of steam specialties for car heating; also the Hancock inspirator.

Western Valve Co., Chicago, samples of valves, cocks, gates, etc.

Fairbanks, Morse & Co., Chicago, new Barrett car box jack, the Sheffield hand and push cars and the Sheffield stand-pipe.

Shields & Brown Co., Chicago, samples of asbestos coverings.

E. C. Dunning, Sioux Falls, the Sprague automatic coupler.

Chapman Jack Co., Cleveland, O., samples of the well-known Chapman jack.

Butler Drawbar Attachment Co., Cleveland, O., samples of the Butler drawbar attachment.

Van Dorston Cushioned Car Coupler Co., Philadelphia, set of full-size M. C. B. couplers.

Schoen Manufacturing Co., Philadelphia and Pittsburgh, Pa., samples of pressed steel stake pockets, corner iron, dead blocks, and centre plates, and blue prints of its patent pressed steel car. This a large exhibit.

Kalamazoo Railroad Velocipede & Car Co., Kalamazoo, hand car; also the U. S. steel surface cattle guard.

Boyden Brake Co., Baltimore, has a special exhibit under a tent showing the Boyden air brake apparatus in full operation.

Dreher Mfg. Co., New York, samples of compound for lubrication.

American Brake Co., St. Louis, Mo., model of driver brake.

Smith Car Journal Oiler Co., Pittsburgh, Pa., samples of Smith's patent oiler and oil box for locomotive and car journals.

Damascus Bronze Co., Pittsburgh, Pa., samples of the Damascus bronze for journal bearings.

National Hollow Brake Beam Co., Chicago, complete set of full size brake beams.

Chalmers-Spence Co., New York, samples of asbestos goods.

Congdon Brake Shoe Co., Chicago; the Ross-Meehan Brake Shoe Foundry Co., of Chattanooga, Tenn.; the Ramapo Wheel & Foundry Co., of Ramapo, N. Y., and the Ramapo Iron Works, of Hillburn, N. Y., samples of brake shoes.

Kling Automatic Car Coupler & Supply Co., of Louisville Ky., model of the Curlin frogless and safety switch and the Kling automatic car coupler.

Coburn Trolley Track Mfg. Co., of Worcester, Mass., full size working model of the Coburn car door hanger and patent trolley track.

Robert Eastwick Car Coupler Co., of New York, automatic car coupler.

New York Car Wheel Works, Buffalo, N. Y., sample of a perfectly balanced car wheel.

P. H. Griffin Machine Works, Buffalo, model of automatic air brake register.

J. Q. Dickenson, Richmond, Va., model of the Moore Truss Rod Yoke.

Jones Safety Spur Lock Co., Syracuse, N. Y., patent nut lock for cars and bridges.

Geo. R. Menecey & Son, Troy, Johnstone's patent radial bearing.

American Flush Car Door Co., Indianapolis, Wagner Car door.

C. P. Hutchin's Sons, Detroit, model of car roof.

Fox Automatic Car Coupling Co., models of new design of the M. C. B. coupler on the standard lines, with

adjustable drawhead. A test was given upon two Chesapeake & Ohio cars.

American Continuous Draw Bar Co., Aurora, Ind. model of continuous draw bar attached to Timms couplers.

Capitol Journal Box Co., Columbus, O., the Capitol journal box, dust guard and end stop.

Mora Flexible Steam Coupling Co., Louisville, Ky., flexible joint for steam heating.

Jewett Supply Co., Boston, model of roller car bearings.

Marden Car Brake Co. model of Marden brake beam.

Carnegie, Phipps & Co., Ltd., of Pittsburgh, are represented by Coolbaugh, McMunn & Pomeroy. The large exhibit includes full-sized pressed steel plates showing a locomotive boiler throat-sheet; specimens of flanged boiler heads and steel for making same.

Fox Solid Pressed Steel Co., Joliet, Ill., pressed steel center plates and locomotive boiler fronts.

McConway & Torley Co., of Pittsburgh, two Janney couplers, on the M. C. B. standard lines, one having a knuckle slotted for a link and pin, the other being the ultimate solid form. They are mounted on movable frames to show the action of coupling.

Roberts Mfg. Co., of Columbus, a system of car heating, one of the novelties of which is in the metallic coupling between cars. This has ball joints and an automatic coupling, all joints of which lie in parallel planes.

Boies Steel Wheel Co., Scranton, Pa., full size car wheels.

Railway Lighting & Heating Co., Philadelphia, is represented by its agents, Coolbaugh, McMunn & Pomeroy, and exhibits the Frost dry carburetor system of car lighting. It has two cars of the Norfolk & Western equipped with this system, and gave an exhibition on Thursday evening.

Ramapo Iron Works, Ramapo, N. Y., boltless steel tired wheel, W. W. Snow's patent.

George Sargeant, Chicago, model of brake beam hanger.

Standard Car Coupling Co., Troy, N. Y., set of M. C. B. automatic vertical plane couplers on the M. C. B. standard lines.

T. A. Bissell, Superintendent Wagner Palace Car Co., Buffalo, N. Y., blue print of a brake shoe hanger.

L. C. Chase & Co., Boston, selling agents of the Sanford Mills, a line of car plushes in 15 grades and colors. One feature of the exhibit shows the effect of the sun upon samples of the Sanford plushes. After an exposure of three months the color of the plush is not perceptibly different from that of the new goods. The firm also exhibits samples of mohair, showing the different processes through which it passes until the dyed plush is finished.

Consolidated Car Heating Co. Albany, N. Y., has a large exhibit, consisting of a complete line of details and sections of cars showing the arrangement. An ingenious glass model of the different systems of heating cars, devised by Mr. J. H. Sewall, of Chicago, Assistant General Manager, is in full operation, with steam furnished by a small nickel-plated boiler. The circulation of the water by steam or fire in the glass pipe is clearly shown. The disc drum, commingler, coil heater, direct steam, return and fire-proof heater systems are shown.

Union Switch & Signal Co., Pittsburgh, a friction buffer arranged on sections of car sills. This buffer has been improved since the exhibition trip around the country. In the new form the friction is greatly increased; the plates are thicker, the pressure on the plates is equalized, the plates are loose instead of close riveted and all tendency to sticking or cutting of the friction surfaces is avoided.

The following supply firms were represented, but without exhibits:

Allen Paper Car Wheel Co., Carey-Ogden Co., Maguire Grain Door Co., Dunham Mfg. Co., Dunham Railway Equipment Co., Adams & Westlake Co., and Chicago Varnish Co., all of Chicago; Ashton Valve Co., Hancock Inspirator Co., Tripp Mfg. Co., Wakefield Rattan Co., and National Tube Works Co. of Boston; Eames Vacuum Brake Co., Safety Car Heating and Lighting Co., Manning, Maxwell & Moore, F. W. Devoe & Co., Thos. Prosser & Son, R. J. Chard & Co., Iron Car Co., D. A. Hopkins Mfg. Co., and Valentine & Co., of New York; Troy Steel & Iron Co., Troy Malleable Iron Co. and Jonas S. Heartt & Co., Troy; Niles Tool Works, Hamilton, O.; Keith Mfg. Co., Sagamore, Mass.; Cliff & Righter Co., Oswego, N. Y.; National Paint Works, Williamsport, Pa.; Westinghouse Air Brake Co., Pittsburgh; Milwaukee Brass & Copper Co., Milwaukee; Pickering Spring Co., Philadelphia; Bridgeport Malleable Iron Co. and De-Oxidized Metal Co., Bridgeport, Conn.; Jackson & Woodin Co., Berwick, Pa.; Dayton Malleable Iron Co., Dayton; Otis Steel Co., Cleveland; Morton Car Heating Co., Baltimore; Solid Steel Co., Alliance, O.; Sharon Steel Casting Co., Sharon, Pa.; Murphy & Co., Newark, N. J.; Paige Car Wheel Co., New York; E. P. Bullard, Bridgeport, Conn., and M. M. Buck & Co., St. Louis.

TECHNICAL.

Manufacturing and Business.

The Marden steel brake beam has been specified for 1,000 cars being built for the New York & New England by the Erie Car Works. The Lafayette Car Works have

also ordered 1,000 beams for cars being built for the Chase Refrigerating Co., and the Wisconsin Central has ordered 2,000. Other orders for brake beams have been recently received from the Wason Mfg. Co., for South American government roads; from the Gilbert Car Mfg. Co., of Troy, for cars for the Chattanooga Union, and from the Eastman Freight Car Heating Co. and the Lynchburg & Durham.

The Dominion Railway Supply Co., Ltd., of Windsor, Ont., has been organized with a capital stock of \$100,000 for the manufacture of various railroad appliances and supplies.

The Johnston Electric Train Signal Co., of Boston, has purchased a valuable property in Woburn, Mass., which it will occupy immediately as a factory. The building is four stories high, has a frontage of about 100 ft. and is about 200 ft. long. It is located near the railroad. The company will set up its machinery at once, and it expects to have 100 mechanics at work within a month. The firm proposes to manufacture not only the train signal but push buttons of all descriptions and several electric hardware appliances.

The contract for rebuilding that portion of the United States Rolling Stock Co.'s car works recently destroyed by fire at Decatur, Ala., has been let to George Moxon, who is to complete the buildings in 90 days. The car-wheel department is running steadily, turning out 60 wheels per day on orders for the Anniston Works of the company, and the Louisville & Nashville machine shops.

The Lane & Bodley Co., of Cincinnati, O., during the week ending June 6, received orders for one 500 h. p. high pressure Corliss engine for the Des Moines Electric Street Railroad; one 500 h. p. compound condensing engine, with surface condenser, for the Cincinnati Electric Light Co., Cincinnati; and one 400 h. p. engine for the Evansville Gas & Electric Light Co., of Evansville, Ind.

The Link Belt Engineering Co., of Nicetown, Philadelphia, is building an extension of the present shop 80 ft. long and 60 ft. wide, and a separate building 180 x 70 ft.

The Damascus Bronze Co., of Allegheny City, Pa., has been chartered, with a capital stock of \$50,000, to manufacture anti-friction metals and alloys. The directors are William T. Paul, of Allegheny, and Frank Scott and Geo. A. McLean, of Pittsburgh.

Extensive improvements have been made to the plant of the Pittsburgh Malleable Iron Co., at Pittsburgh, and several new departments are being erected.

The Smith Car Journal Oiler Co. has been chartered to manufacture mechanical appliances for car journals and axles. The headquarters will be in Allegheny City, Pa. The directors are: William T. Paul and George A. McLean, of Allegheny; Frank Scott, of Pittsburgh; William O. Smith, of Newark, O., and Thomas Fletcher, Jr., of Cleveland, O.

The Lidgerwood Mfg. Co., of New York City, has recently appointed the firm of Frazer & Chalmers its representatives in Utah, Montana and Idaho for the sale of the company's improved hoisting engines for mines in that section of the West. The company is now turning out from three to five engines a day.

The following officers and directors of the Consolidated Car Heating Co. were elected at the annual meeting, held in Albany, N. Y., June 3. The only change of especial importance is the election of Mr. George Westinghouse, Jr., as Vice-President, as noted last week. Directors: Robert C. Pruyn, George Westinghouse, Jr.; George M. Gray, R. C. Blackall, William G. Rice, George L. Walker, A. S. Hatch, Charles J. Peabody, J. H. Sewall, Albion Little, D. D. Sewall, Anthony N. Brady, H. S. Osgood, J. F. McElroy, Caleb H. Jackson. Officers: President, R. C. Pruyn; Vice-President, George Westinghouse, Jr.; Vice-President and Treasurer, W. G. Rice; Secretary, J. Peabody; General Manager, Daniel D. Sewall; Mechanical Superintendent, James F. McElroy, and Assistant General Manager, J. H. Sewall.

Iron and Steel.

The Nova Scotia Steel & Iron Co., of New Glasgow, N. S., has completed its organization under the new charter granted by the Nova Scotia Legislature. The authorized capital stock is \$3,000,000. The company is at present employing about 450 men and will increase this force as soon as the new blast furnace has been completed. The erection of this furnace will be begun immediately.

Carnegie Bros. & Co., Ltd., of Pittsburgh, are putting in 16 additional boilers, which are 28 ft. long, with two 7-in. flues, at the Edgar Thomson Steel Works, at Braddock, Pa.

The Pittsburgh Bridge Co. is at work on an iron annex to the ladle department of the Allegheny Bessemer Steel Co. and an iron building for the Dithridge Glass Co. The company is now erecting its new large machine shop.

The West Superior Iron & Steel Co. intends to build a Bessemer works and rolling mill for steel plates, beams and structural shapes.

The Pulaski City Development Co. has awarded the contract to the American Bridge Co., of Roanoke, Va., for the construction of its 150-ton furnace at Pulaski, Va.

The new plant of the Greensburg Steel Co., at Huff station, Pa., is now in operation. The plant contains a single and double heating furnace, one welding furnace and a 24-pot crucible furnace, and is also equipped with a 600-lb. and a 1,200-lb. hammer, built by S. Trethewey & Co., Limited, of Pittsburgh. The firm manufactures tool steel exclusively.

The Monongahela Furnace Co., of McKeesport, Pa., has elected E. C. Converse, President; W. S. Eaton, Treasurer, and W. B. Schiller, General Manager. This company is erecting two large blast furnaces at McKeesport which will probably be ready for blast about Aug. 15 next. They will have a combined capacity of about 500 tons per day.

St. Clair Tunnel.

The length of the proposed tunnel from portal to portal is 6,000 ft.; finished on Canadian side, 1,905 ft.; finished on United States side, 2,245 ft. One hundred and five feet of the tunnel were completed last week and only 1,850 ft. remain yet to be finished. It is expected that it will be completed in 12 weeks.

Rails in Germany.

At a recent letting by the administration of the Prussian state railroads of 1,350 tons of steel rails and 1,190 tons of "Ingot iron longitudinal sleepers," the contract was awarded at 160 and 150 marks per ton respectively at the works. This is equivalent to \$38.52 and \$36.12 per gross ton.

THE SCRAP HEAP.

Notes.

A girl 20 years old tried to wreck a train on the Michigan Central near Union City, Mich., May 27, because she was refused a ride on freight trains.

The Rio Grande Western has completed an attractive new building just south of the Salt Lake City station. The lower floor is used for a baggage and express office, and the upper story for the auditor's offices. This company has also enlarged its freight houses in Salt Lake City, remodeled its yards, and added new machinery to its shop. The company will also soon construct a large storehouse and oil room at the shops in Salt Lake.

The Union Pacific will shortly commence work on a switching yard at Salt Lake City to accommodate 500 cars, which will cost over \$50,000. The yard will contain about four miles of track. The company will also build two new freight stations on First South street. Probably \$200,000 will be expended in and around Salt Lake City by this company during 1890 in various improvements.

A Northern Pacific through train was stopped by train robbers near New Salem, N. D., at 2 a. m., June 8. The mail car was robbed of a lot of registered letters, but the express messenger secreted his money under boxes, put out his lights and escaped from the train while the robbers were subduing the engineer by means of pistol shots. The robbers were disappointed at the small amount of booty in the forward cars and apparently were scared off before they got ready to attack the passenger cars.

A St. Louis, Arkansas & Texas southbound express train was ditched and the express car robbed of \$10,000, at Haywood's Spur, two miles south of Texarkana, Ark., at 12:30 a. m., June 10. The switch was thrown at the Spur and the engine left the track. Six masked men went through the express car, but did not molest anything else on the train. After the robbery the robbers took the engineer, fireman and express messenger to the woods and shot the messenger three times, in the hand, ear and arm. A tramp stealing a ride on the mail car was killed. A sheriff and posse went in pursuit of the robbers.

Street Railroads.

Salt Lake City has some 15 miles of electric street railroads in operation and some 20 miles under construction. A road, 18 miles long, is in process of construction to Garfield Beach, a bathing resort on the shores of Great Salt Lake. It will be run by a steam motor.

The electric railroad between Victoria and Esquimault, B. C., is expected to be in operation by Sept. 1. Trucks of 30 h. p. upon the Thomson-Houston system are to be used, promising a rate of 20 miles an hour for the distance, five miles.

A Johnstown Damage Suit.

In the suit of Tarbell against the Pennsylvania Railroad, the Johnstown case, at Pittsburgh last week the attorneys for the railroad moved the Court to enter judgment of compulsory non-suit for a number of reasons, mainly that the flood was a visitation of Providence and was of such an extent and so enormous that neither human judgment nor the best of care could either anticipate it or provide against it.

The judge, however, refused, preferring to hear all the evidence before deciding the questions raised in the motion. The trial then proceeded.

Report on the Chesapeake & Ohio Canal.

The receivers appointed by Chief Judge Alvey of Maryland to investigate the condition of the Chesapeake & Ohio Canal have reported against the repair of the canal. It will now be sold or leased, and a railroad constructed along the towpath. A company is already organized for that purpose.

Abolishing Grade Crossings.

The City Council of Elizabeth, N. J., has accepted the proposition of the Pennsylvania and Central of New Jersey roads to elevate and depress their tracks through the city. It is estimated that the improvement will cost the Pennsylvania \$600,000 and the Central road \$400,000.

The Pacific Railroads in Congress.

Representative Miles, of Connecticut, from the Committee on Pacific Railroads, has reported to the House the bill agreed upon by the committee for the refunding of the Government indebtedness of the Union and Central Pacific Railroad companies. The report discusses the situation in the same manner as the previous reports on the same subject, and comes to the same general conclusions. The differences between it and the bill by the Senate committee are, in brief, that in the House bill one-half of the interest on the Union Pacific debt for the first ten years has been capitalized, and that in the distribution of payments in the case of the Central Pacific the method prescribed for the Union Pacific has been followed. The bills agree, however, in fixing the rate of interest at three per cent. for the Union Pacific and two per cent. for the Central Pacific, and the period of adjustment at 75 years for the Central Pacific and 50 years for the Union Pacific.

An Expensive Pleasure-Ride.

The iron bridge in process of construction over Marble creek, near Nicholasville, Ky., on the Richmond, Nicholasville, Irvine & Beattyville Railroad, was damaged on May 18 to the extent of \$20,000, as the result of negligence of the watchman and innocent fun on the part of two young men and their sweethearts stealing a ride on trucks. The bridge is 216 ft. high, and the span was over half completed. On the day in question the parties started for a ride from the tunnel, approaching the bridge on a down grade. When they found they could not stop the trucks they jumped for their lives, as they neared the unfinished structure. A moment later the trucks ran into the "traveler," and, with a mighty crash, it bounded to the unfinished piers and completely demolished everything below. It will take 90 days to repair the loss.

LOCOMOTIVE BUILDING.

The Manhattan Elevated road (New York City) has invited bids on 50 engines weighing 23½ tons, to replace a similar number of lighter engines now in service.

The Lake Shore and Michigan Southern has received this month 20 ten-wheel locomotives from the Brooks Locomotive Works, Dunkirk, N. Y., and five six-wheel switching engines from the Rogers Locomotive Works of Paterson, N. J.

The Chignecto Ship Marine Railroad has ordered four 90-ton locomotives from the Canadian Locomotive & Engine Co., of Kingston, Ont.

The Montgomery, Tuscaloosa & Memphis has recently received eight locomotives from the Brooks Locomotive Works.

H. K. Porter & Co., of Pittsburgh, have nearly completed two locomotives for use in coal mines in northern Mexico. The engines are 6 ft. high, weighing $7\frac{1}{2}$ tons, and have 7 x 12 cylinders. The firm has also shipped a heavy shifting engine to the Johnson Co., of Johnstown, Pa.

Two new locomotive engines arrived this week for the Savannah & Atlantic.

The Norfolk & Western has just received a new ten-wheel passenger engine from the Rogers Locomotive Works, of Paterson, N. J.

The Marietta & North Georgia road has received a new passenger engine from the Baldwin Locomotive Works.

CAR BUILDING.

The Manhattan Elevated road has issued specifications for 82 new standard passenger coaches and bids for building them will be received until June 16. The cars will have four pair of high back transverse seats in the centre of the car, and will be like the sample car now running on the Forty-second street branch of the Third Avenue line.

The United States Rolling Stock Co. is building 200 box and stock cars for the Montgomery, Tuscaloosa & Memphis.

The Mexican National is in the market for about 200 freight cars.

The Charleston, Sumter & Northern is reported to have invited bids for the construction of about 400 freight cars.

The Columbus, Hocking Valley & Toledo has 500 box cars under contract to be delivered by July 20.

The Toledo & Ohio Central has recently placed an order for 500 coal cars.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered two parlor cars from the Barney & Smith Mfg. Co., of Dayton, O.

The Atchison, Topeka & Santa Fe is building several passenger car at its Topeka shops from designs by Harvey Middleton, the late Superintendent of machinery. The cars will be equipped with the Scarritt reclining chairs made by the Scarritt Furniture Co., of St. Louis, which will be finished in gold plush.

The Elliott Car Works, of Gadsden, Ala., have recently delivered to the Alabama Great Southern 100 of Tomlinson's patent dump cars. The firm is working on an order for 40 ore dump cars and four cabooses for the East & West of Alabama.

The Missouri, Kansas & Texas road has let the contract for 100 furniture cars to the United States Rolling Stock Co.

The Norfolk & Western has received two passenger coaches from the Billmeyer & Small Co., of York, Pa.

The Ensigen Car & Mfg. Co., of Huntington, W. Va., has broken ground for a 70 x 70 ft. addition to its foundry and machine shops. The concern has for several months past been very busy completing orders for cars.

Fairbanks, Canning & Co. are asking bids on 200 refrigerator cars.

Armour & Co., of Chicago, will build 200 refrigerator cars.

BRIDGE BUILDING.

Augusta, Ga.—A bill has been introduced in the city council providing for the erection of a new bridge over the canal on Broad street.

Battleford, Can.—An iron bridge is being built across the Battle River, at Battleford, Saskatchewan, which, when completed, will have cost about \$25,000. The bridge will probably be opened early in July.

Buncombe County, N. C.—The Board of Magistrates will probably construct two bridges across the French Broad River and one over Cane Creek.

Chicago.—The following bids for the erection of a swing bridge at Northwestern avenue were received by the City Engineer: King Iron & Bridge Co., \$14,950; Chicago Bridge & Iron Works, \$14,115; Shailer & Schniglan, \$14,930; Bruder & Seifert, \$14,000; Lane Bridge & Iron Works, \$17,387; Wrought Iron Bridge Co., \$15,644.

Denison, Tex.—The Red River Bridge Co. has let the contract for the construction of its bridge to the Missouri Valley Bridge Co., of Leavenworth, Kan., at \$50,000.

Evansville, Ind.—The Board of Commissioners of Vanderburgh County, Ind., will receive sealed proposals until July 18 for erecting a wrought iron bridge on Water street over Pigeon Creek, referred to two weeks ago. It will be 200 ft. long, with a 24 ft. roadway, and two sidewalks of 6 ft. each. Trusses to be calculated for a moving load of 2,400 lbs. per lineal foot. Beam and joists to be calculated for a load of 100 lbs. per square foot for driveway and 80 lbs. per square foot for sidewalks. Jas. D. Parvin is Auditor.

Front Royal, Va.—The Front Royal & Riverton Improvement Co. will build one or more iron bridges. G. W. Cone is Vice-President.

Houston, Tex.—A bridge to connect the Second and Fifth wards is proposed.

Lexington, Va.—The Groton Bridge & Mfg. Co., of Groton, N. Y., has been awarded the contract for the construction of two bridges for \$2,585.

Milwaukee, Wis.—The contract for the superstructure of the Michigan street draw bridge has been awarded to the Milwaukee Bridge & Iron Works at \$14,955.

Mitchell, S. D.—Proposals are wanted until July 17 for erecting a bridge at Mitchell by R. Robinson, of Mitchell.

New York City.—The commissioners appointed to select a site for the proposed Hudson River bridge have organized, with Andrew H. Green, President; Evan Thomas, Secretary; Charles H. Swann, Assistant Secretary; Charles N. Vail, Treasurer. The other commissioners are Col. F. K. Hain and Isadore Strauss. The commission has the power to decide where the New York terminus of the bridge shall be, as the law permits it to be placed anywhere within two miles on the river-front. Sessions were held this week at 216 Broadway.

This act requires the bridge to be constructed with a single span over the river at an elevation of at least 145 ft. above mean high water at the piers, and 155 ft. at the centre of the span. The Commissioners are authorized to receive subscriptions to the capital stock to the amount of \$300,000, and when ten per cent. of that has been paid in the corporation is to be organized and take control.

Oil City, Pa.—The County Commissioners of Venango County invite proposals, up to June 19, for four single span iron bridges, 64, 57, 42 and 36 ft. span each.

Pembina, N. D.—Proposals are wanted until July 8 for the erection of a bridge at Pembina, by the County Auditor.

Philadelphia.—The new bridge over the Schuylkill River from City avenue to Robinson's Knoll, which has just been finished by the City Avenue & Germantown Bridge Co., was formally opened June 6.

Vernon, Tex.—The Milwaukee Bridge & Iron Works has received the contract at \$43,000 to rebuild the Pease River bridge and also four bridges on Beaver Creek.

Waddington, N. Y.—The Governor has approved the bill incorporating the Waddington Bridge Co. for constructing a bridge over the St. Lawrence River between St. Lawrence county and Canada.

Wheeling, W. Va.—The City Council of Wheeling has adopted plans for a stone bridge of 150 ft. span, single arch, 30 ft. high, above low water mark.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Northwestern, semi-annual, 3 per cent. on the common stock, and quarterly, 1½ per cent. on the preferred stock, payable June 20.

Manhattan (Elevated), quarterly, ½ per cent., in scrip, payable July 1.

Mobile & Girard, \$1.50 per share, payable on demand.

Northern Pacific, quarterly, \$1.00 per share, payable July 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Adirondack, special, adjourned, 21 Cortlandt street, New York City, July 7.

Cincinnati, Hamilton & Dayton, annual, 200 Fourth street, Cincinnati, Ohio, June 17.

Indianapolis & Northeastern, special, Indianapolis Ind., June 27.

Memphis & Charleston, special, Memphis, Tenn., July 9.

Missouri Pacific, special, St. Louis, Mo., July 15.

Mobile & Girard, annual, Girard, Ala., July 2.

Nashville, Chattanooga & St. Louis, special, Nashville, Tenn., June 25.

Northern of New Jersey, annual, Englewood, N. J., June 18.

Pratt Coal, Iron & Railway Co., special, Birmingham, Ala., June 28.

Shamokin, Sunbury & Lewisburg, special, Philadelphia, Pa., June 25.

St. Louis & San Francisco, special, St. Louis, July 21, to vote on the proposition of an increase of the common stock of the company.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Railway Master Mechanics' Association will hold its next annual convention at Old Point Comfort, Va., beginning June 17.

The International Association of Car Accountants will hold its fifteenth annual convention at the Hotel Brunswick, New York City, June 24, 25 and 26.

The Association of American Railway Accounting Officers will hold its next annual meeting at the Stockton Hotel, Cape May, N. J., July 9.

The National Association of General Baggage Agents will hold its next annual convention at Chicago, Ill., July 16.

The Traveling Passenger Agents' Association will hold its next annual convention at Buffalo, N. Y., August 19.

The New England Roadmasters' Association will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m. The Club has adjourned until Tuesday, Sept. 16.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The Northwestern Track and Bridge Association meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York. The annual convention will be held at Cresson, Pa., June 26.

The Boston Society of Civil Engineers holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1122 Girard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the Southwest holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Society of Civil Engineers' Annual Convention of 1890.

The following additional papers are announced for presentation at the Convention:

The three River Spans of the Bridge Recently Completed across the Ohio River at Cincinnati, William H. Burr.

The Beginnings of Engineering with Special Reference to early Engineering Science in America, J. Elfreth Watkins.

On Truss Bridges, Onward Bates.

One Way of Obtaining Brine, Charles B. Brush.

The Self-registry of Effects of Strain in Metals, Robert H. Thurston.

Comparison of Water Supply Systems from a Financial point of view, J. Leland Fitzgerald.

Arrangements are being made both for local accommodation at Cresson and for visits, by the courtesy of the Pennsylvania Railroad, to a number of points of great interest, including Altoona, Johnstown and other places.

Engineering Association of the Southwest.

A regular meeting of the Engineering Association of the Southwest has been announced for June 12, at 8 p. m. The following papers will be read:

"Coke Making in the Western Kentucky Coal Field," by John B. Atkinson, of Earlinton, Ky. "The Foundations of the Georgia Pacific Railroad Bridge over the Yazoo River, Miss.," by A. V. Gude, of Atlanta, Ga.

"The Measurement of the Discharge of the Tennessee and Cumberland Rivers," by C. A. Turrell, Nashville, Tenn.

Engineers' Club of Philadelphia.

A regular meeting was held May 17, President H. W. Spangler in the chair; 35 members and 2 visitors present.

Prof. J. W. Redway read a paper on the Physical Geography of the Mississippi River. The Secretary presented, for Mr. Geo. W. Creighton, a paper on Rail Joints.

The Club then adjourned to the lower rooms to engage in social intercourse and partake of the lunch which had been provided under the direction of a committee consisting of Messrs. Edward Hurst Brown, Chairman; M. R. Muckle, Jr., and Henry G. Morris.

Engineers' Club of St. Louis.

The club met June 4 in the Elks' Club rooms, President Nipher in the chair; 30 members and three visitors present. The Executive Committee reported the action taken at its last two meetings, announcing that the Journals of all delinquents had been ordered stopped, and that the names of W. Adams, J. W. Cordes and R. D. O. Johnson had been dropped from the rolls.

The Executive Committee reported the approval of J. G. Jennings' application for membership. He was ballotted for and elected. Col. Meier, President of the Committee on Eads' monument, announced the formation of the Eads Monument Association, and suggested the advisability of the members of the club joining the association.

He stated that a meeting would be held at the Mercantile Club at 3 p. m. June 7 to effect a permanent organization.

Mr. Russell, chairman of the Committee on Local Data, then presented his report. The nature of the matter collected was explained, and the ground covered, and the names of the contributors were given. Some informal discussion of the matter presented took place, participated in by Messrs. Potter, Meier, Russell, Bryan, Seddon, Nipher, Crosby and Farnham.

On motion of Prof. Potter, it was ordered that the committee be continued, with authority to employ expert assistance, if necessary, to edit the report, and to secure for the club estimates on the cost of publication, the treasurer to be made a member of this committee when matters of expense were under consideration.

Prof. Nipher called attention to the fact that rainfall in the State of Missouri was almost exactly equivalent to the river discharge at St. Louis.

It was ordered that an extra meeting be held on June 18.

Roadmasters' Association of America.

The annual convention meets in Detroit on Sept. 9. Among the subjects to be considered are the following:

Rail Joints—Committee: R. Black, Manhattan; John Doyle, Detroit, Lansing & Northern; B. Murtagh, Central of New Jersey; W. H. Stearns, Chicago & Northwestern; C. E. Marvin, Central of Georgia. Preservation of Sleepers from Wear and Decay—Committee: C. H. Cornell, Chicago, Milwaukee & St. Paul; G. Wright, Atchison, Topeka & Santa Fe; J. Supple, Pennsylvania; J. R. Patch, Connecticut River; B. M. Burroughs, Sioux City & Pacific. Nut Locks, Track Bolts and Spikes—Committee: G. W. Bishop, Fitchburg; Michael Philbin, Chicago, Rock Island & Pacific; J. M. Meade, Atchison, Topeka & Santa Fe; D. Kindelan, Chicago, Milwaukee & St. Paul. Education of Sectionmen for Foremen—Committee: Richard Caffrey, Lehigh Valley; W. Riley, Chicago & Alton; J. W. Craig, Charleston & Savannah; O. F. Jordan, Michigan Central. Interlocking Switches and Signals—Committee: J. Wynn, St. Louis Bridge Co.; R. Black, Manhattan; G. Offutt, Long Island. The Secretary of the Association is John F. Ramsey, of the Cincinnati, Hamilton & Dayton.

Western Society of Civil Engineers.

The Committee on Bridge Legislation of the society, which was appointed at a meeting of the society on March 5 to make a report in regard to the regulation of the construction and maintenance of highway and railroad bridges in the interest of public safety by legislation, has issued a circular containing a series of questions, and upon the information obtained the committee

will in part base its recommendations. Data upon the following points is desired: 1st. Foreign custom and laws in regard to the construction and inspection of railroad and highway bridges. 2d. The manner in which this question has been treated and any legislation had thereon in the United States. 3d. The points in bridge designing and construction which need special attention. 4th. Former bridge accidents and their causes. 5th. Standard plans and designs of railroad bridge floor systems. The members of the committee are: O. Chanute, F. C. Carter, J. F. Wallace, M. Seifert and W. E. Williams. Replies should be addressed to the "Committee on Bridge Legislation," Western Society Civil Engineers, 78 La Salle street, Chicago.

PERSONAL.

—Mr. W. H. Harrison, Superintendent of Bridges of the Chicago, Santa Fe & California, died suddenly at Streator, Ill., June 5.

—Mr. E. J. Cuyler, Superintendent of the Wisconsin Division of the Chicago & Northwestern, has resigned on account of ill health.

—Mr. J. F. Ewing, General Agent of the Freight Department of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, has resigned.

—Mr. Robert Harris, formerly Chairman of the Northern Pacific, was elected a director of the Toledo, St. Louis & Kansas City road at the annual meeting this week.

—Mr. S. H. Harrington, late Mechanical Engineer of the New York, Lake Erie & Western, at Susquehanna, Pa., has accepted a position with the Gould Manufacturing Co., of Buffalo.

—Mr. W. A. Vaughan, Superintendent of the Saginaw and Mackinaw division of the Michigan Central, has resigned to accept a position with the East Tennessee, Virginia & Georgia.

—Mr. A. J. Speese, Transportation Master of the Philadelphia & Reading, has resigned that position to engage in business for himself. Mr. O. W. Stager, Assistant Transportation Master, succeeds him.

—Mr. Frank W. Hammett, Resident Engineer of the Alabama Great Southern, at Birmingham, Ala., has resigned to accept a position with the Rosetta Street Grading & Improvement Co., of New Orleans.

—Miss Grace Oakes, the eldest daughter of President Thomas F. Oakes, of the Northern Pacific, and Mr. Frederick Brooks, son of Francis Brooks, of Boston, were married last week at Thorwood, Mr. Henry Villard's country house, at Dobbs Ferry, N. Y.

—Mr. H. W. Clark, Division Superintendent of the Illinois Central, has been appointed Superintendent of the Mobile division of the Mobile & Ohio, to succeed Mr. Daniel McMaran, who was recently appointed General Superintendent. Mr. Clark is a son of Col. J. C. Clark, President of the road.

—Mr. J. F. Goddard, late Third Vice President and Traffic Manager of the Atchison, Topeka & Santa Fe, has accepted the position of Chairman of the Western Passenger Association, which will be organized in place of the old Western States Passenger Association. This position was tendered him soon after his resignation.

—Mr. Benjamin Hurst, who was one of the first locomotive engineers employed by the New York & Erie Railroad 50 years ago, died last week, at the age of 80, and was buried at Port Jervis, N. Y. It is said that his summary discharge from the company's service in 1851 was the occasion of the first great railroad strike in this country. Mr. Hurst was an active engineer for 51 years.

—Mr. Herbert C. Felton, Division Superintendent of the Kaighn's Point & Terminal Ferry Co., has been elected a director of the Atlantic City road. Both companies are controlled by the Philadelphia & Reading. Mr. Felton is a graduate of the Rensselaer Polytechnic Institute, of Troy, N. Y., from which he has graduated many of the officers now holding responsible positions in the operating and engineering departments of the railroads of this country.

—Mr. Edward Dickinson has resigned his position as General Manager of the Missouri River Division of the Union Pacific, to which he was appointed last November, after a service with that company of 18 years. During that time he served as train baggage master, train dispatcher, General Superintendent of the Wyoming Division, Assistant General Superintendent and General Superintendent. Mr. Dickinson is 40 years old, and has been in railroad service since 1862, beginning as a messenger boy in the freight office of the Cleveland & Toledo road.

—On Queen Victoria's last birthday she issued as usual a list of those on whom she had been graciously pleased to confer the honor of knighthood. One of the two Canadians so honored was Casimir Stanislaus Gzowski, member of the American Society of Civil Engineers. For the past 11 years Sir Casimir has been Aide-de-Camp to the Queen in Canada. He is by birth a Russian, but came to Canada in 1840, and in 1849 was appointed Chief Engineer of the St. Lawrence & Atlantic Railroad. His construction of the International bridge over the Niagara river which involved founding the masonry piers in a very rapid current was a very successful piece of engineering.

ELECTIONS AND APPOINTMENTS.

Alabama, Georgia & Florida.—The following are named as incorporators in the Alabama charter recently filed: G. Gunby Jordan, T. C. S. Harwood, Clifton Jones, Seth N. Jordan, M. E. Gray, Thomas J. Chappell, Henry R. Goetchins, all of Columbus, Ga., and W. F. Foster, of Tuskegee, Ala.

Altoona & Wapamonock.—The following are the directors of this Pennsylvania road, which was chartered last week: F. G. Patterson, President; M. A. Green, Vice-President; W. L. Shellenberger, W. S. Lee, W. W. Yon, C. A. Wood, John A. Canan, M. Scott Gwin, W. J. Heinsling, A. C. Shand, and S. M. Griffiths, all of Altoona.

American Midland.—C. H. Roser has been appointed Receiver with office at Findlay, O., to succeed J. P. Caruthers, resigned.

Baltimore & Ohio Southwestern.—S. W. Stone has been appointed Consulting Engineer and D. D. Carothers, Engineer of Maintenance of Way of the road.

Boston & New York Air Line.—At the annual meeting in Middletown, Conn., June 3, the following directors were elected: Henry B. Hammond and S. S. Sands, New York; T. L. Watson and W. D. Bishop, Bridgeport; S. F. Loomer, Willimantic; S. E. Baldwin, C. P. Clark and E. H. Trowbridge, New Haven; Theodore Adams, Philadelphia; J. M. Camp and Benjamin Douglass, Middletown. The directors chose these officers: H. H. Hammond, President; T. L. Watson, Secretary, and W. L. Squire, Treasurer.

Canon City, Salida, & Pacific.—The incorporators of this Colorado company are: Thomas Macon, Charles E. Waldo, Robert Savage, W. H. Murray, Thomas Thornton, F. A. Reynolds and Robert S. Lewis, of Canon, Colo.

Central of Georgia.—D. H. Bythwood, chief clerk to the General Passenger Agent has been promoted to the office of Division Passenger Agent of the road, with headquarters at Columbus, Ga.

Chicago, Burlington & Northern.—W. J. C. Kenyon has been appointed General Freight Agent, in addition to his duties as General Passenger Agent, to succeed W. B. Hamblin, who has been appointed Assistant General Freight Agent of the Chicago, Burlington & Quincy.

Chicago, Milwaukee & St. Paul.—A. J. Earling has been elected General Manager, and W. G. Collins has been elected General Superintendent, with office in Milwaukee, Wis., to succeed him. Henry R. Williams, Superintendent of the Kansas City Division, succeeds Mr. Collins as Assistant General Superintendent, with office at Milwaukee.

Chicago & Northwestern.—At the annual meeting in Chicago last week the old directors were re-elected. The following officers were also re-elected: Chairman of the Board, Albert Keep; President, Marvin Hughtitt; Vice-President, Treasurer and Secretary, M. L. Sykes. Executive Committee: Albert Keep, Marvin Hughtitt, W. L. Scott, A. G. Dulman, C. M. Depew, H. McK. Twombly, Samuel F. Barger and David P. Kimball.

Chicago, Rock Island & Pacific.—John H. Long, General Agent of the road in Cincinnati for several years, has been transferred to Chicago, with the same title. R. B. Jones succeeds Mr. Long at Cincinnati.

Chicago, St. Paul, Minneapolis & Omaha.—At the annual meet of the road held at Hudson, Wis., the following directors were re-elected for three years: Marvin Hughtitt, David P. Kimball, E. W. Winter, W. L. Scott and C. M. Depew. The following officers were elected: President, Marvin Hughtitt; Vice-President, Treasurer and Assistant Secretary, M. L. Sykes; Assistant Treasurer, S. O. Howe; Local Treasurer at St. Paul, S. W. Clark; Secretary, E. E. Woodman. The Executive Committee is: Marvin Hughtitt, Albert Keep, C. M. Depew, Cornelius Vanderbilt, M. L. Sykes, W. K. Vanderbilt and David P. Kimball.

Chicago & Western Indiana.—At the recent annual meeting the old Board of Directors was re-elected, with the exception of J. B. Carson, who was succeeded by Dr. William L. Breyfole. Volney T. Malott was elected President and B. Thomas, Vice-President.

Choctaw Coal & Railway Co.—Walter Chamberlain has been appointed Auditor, to succeed S. A. Bentley, resigned.

Cincinnati, Georgetown & Portsmouth.—John C. McQuiston has been appointed Superintendent of the company, vice Thomas Taggart, resigned.

Cleveland, Chagrin Falls & Northern.—The jurisdiction of the following officers of the Cleveland & Canton has been extended over this road: H. A. Kennedy to be Assistant Superintendent; Albert Rokusek, General Passenger Agent; Henry R. Moore, General Freight Agent; E. T. Blood, Division Roadmaster, and John Bean Master Mechanic.

Cleveland, Cincinnati, Chicago & St. Louis.—Edward Hill, Purchasing Agent of the road, has resigned, and the jurisdiction of J. A. Barnard, Assistant General Manager, will be extended over that department. The resignation is to take effect July 1.

Concord & Claremont.—The following Board of Directors was elected at the annual meeting of the road held at Concord, N. H., May 29: Alvah W. Sulloway, George E. Todd, Charles O. Stearns, Daniel W. Johnson, Augustus E. Scott, Frank Jones and William F. Thayer. A. W. Sulloway was elected President and Daniel Barnard Clerk.

Cornwall & Lebanon.—The duties of General Freight and Passenger Agent have been assumed by Ned Irish, in addition to those of his present office, General Superintendent.

Duluth & Iron Range.—At the annual meeting of the company held at Duluth, Minn., June 9, the following were elected as officers: H. H. Porter, Chairman; H. R. Bishop, President; M. J. Carpenter, Vice-President and General Manager; C. W. Hilliard, Secretary, and H. A. Patterson, Treasurer.

Fort Wayne, Cincinnati & Louisville.—H. H. Crosby has been appointed Master of Transportation, to succeed R. B. Starbuck.

Fort Worth & Rio Grande.—M. Shaughnessy has been appointed Roadmaster, with office at Dublin, Tex., in charge of track repairs.

Frankfort & Southeastern.—Henry Day has been elected President of the road, with office in New York City.

Georgia Pacific.—William H. Owens has been appointed Master Mechanic, with headquarters at Birmingham, Ala., vice W. T. Newman resigned. The appointment took effect June 9. Mr. Owens was formerly foreman of the Richmond & Danville shops at Manchester, Va.

Great Northern.—John N. Abbott has been appointed Assistant to the President, and will give particular attention to matters affecting the revenues of this company and its proprietary lines.

Illinois Central.—J. L. Williams has been appointed Acting Division Engineer to succeed H. P. Farrar, resigned to accept service with another company.

Indiana Mineral Springs.—The directors for the first year are: D. J. Mackey, E. P. Huston, James L. Mackey, G. J. Grammer, W. J. Lewis, E. B. Morgan and Edwin Taylor, all of Evansville, Ind.

Jamestown & Northeastern.—The stockholders elected the following directors last week: E. F. Dickinson, S. B. Broadhead, Robert N. Marvin, Jamestown, N. Y.; W. N. Kelley, Sinclairville, N. Y.; C. A. Clute, O. W. John-

son, G. E. Shaw, William Martin, D. A. Barnes, D. C. Moon, J. C. Breck, W. T. Coleman, W. E. Candee, Dan-kirk, N. Y.

Johnsonville & Rutland.—Henry M. Polhemus, Astoria, N. Y.; Edward Smith, Walter H. Powers, Gideon N. Bartlett, John M. Carter, John Whalen, George Hill, Cornelius V. Sidell, Albert H. King, William H. Wiley, New York City; William A. King, Norfolk, Va.; Charles Wiley and Frederick Adams, East Orange, N. J., are the first directors of this recently chartered New York company.

Keokuk & Des Moines.—The stockholders have elected the following directors: H. A. Barling and Robert C. Gerboth, of New York, and David Dows was elected to succeed David Dows, Sr., deceased.

Manchester & Lawrence.—At the annual meeting of the stockholders of the road at Manchester, N. H., May 30, the following directors were elected: C. A. Sinclair, G. B. Chandler, H. F. Straw, J. W. Saborn, E. R. Brown, W. F. Fowler, and J. C. Moore. The directors elected C. A. Sinclair, President; Henry Chandler, Treasurer; C. B. Gafney, Clerk.

Manitoba & Southeastern.—The following directors were elected at the annual meeting of the road held at Winnipeg, Man., June 3: Alexander Logan, W. R. Sinclair, James O'Connor, Henry Hickson, Edmond Trudel, Robert Bullock and Roger Maric. The directors elected officers as follows: Alexander Logan, President; James O'Connor, Vice-President, and Edmond Trudel, Secretary.

Mexican Central.—At a meeting of directors in Boston this week Levi C. Wade was re-elected President. The other executive officers were also re-elected.

Minneapolis, St. Paul & Sault Ste. Marie.—Frederick N. Finney has been elected President of this road, with office in Minneapolis, to succeed Thomas Lowry, resigned.

Mobile & Ohio.—H. W. Clark has been appointed Division Superintendent with office at Mobile, Ala., and H. P. Farrar, has been appointed Chief Engineer with office at the same place.

Monterey & Mexican Gulf.—The following appointments have recently been made: C. Dewese, Auditor of Construction Accounts; John Grace, General Superintendent, and J. J. Cooke, Commercial Agent.

New Orleans Union.—The directors of the company are: John A. Grant, General Manager of the Texas & Pacific; John G. Mann, Superintendent of the Illinois Central; Julius Kruttschnitt, General Manager of the Southern Pacific; J. T. Harahan, General Manager of the Louisville, New Orleans & Texas; and John Glenn, Jr., of the New Orleans & Northeastern, and the Mayor of the City of New Orleans, ex-officio. The officers of the company are Julius Kruttschnitt, President; M. R. Spellman, Vice-President and General Manager, and John Glenn, Jr., Secretary and Treasurer.

New York, Lake Erie & Western.—The Jefferson Branch has been made a separate division, and W. L. Derr, now Assistant Superintendent, has been appointed Superintendent, with headquarters at Carbondale, Pa.

S. H. Harrington, Mechanical Engineer of the road, with headquarters at Susquehanna, has resigned, and A. E. Mitchell, Engineer of Tests, has been appointed to succeed him.

W. H. Tennis has been appointed General Agent of the Freight Department with headquarters at Indianapolis, Ind., in charge of the freight traffic of the company and its leased lines.

Norfolk & Virginia Beach.—J. M. Dickey has been appointed General Superintendent of the road, vice G. M. Hughes, resigned.

Northern (N. H.).—The following directors were recently elected: A. W. Sulloway, Franklin, N. H.; J. H. Benton, Jr., Silas Pierce, B. P. Cheney, U. H. Crocker, Boston, Mass.; G. E. Todd, Concord, N. H., and Dexter Richards, Newport, N. H.

Northern Pacific & Idaho.—The incorporators of this Washington road are: John H. Mitchell, Jr., William O. Chapman and Herbert Huson, of Tacoma, Wash.; James B. Williams of Stamford, Conn., and Henry Stanton, of New York City.

Oregon Improvement Co.—The title of O. F. Briggs is General Freight and Passenger Agent, instead of Traffic Manager, as announced.

Pemigewasset Valley.—At the annual meeting of the road held at Plymouth, N. H., May 26, the following directors were elected: John J. Bell, Exeter, N. H.; Daniel Saunders, George W. Hill, Lawrence, Mass.; J. W. Campbell, Woodstock, N. H.; Daniel Barnard, Franklin, N. H.; John C. French, Henry Chandler, James A. Weston, Manchester, N. H., and John J. Cilley, South Dearfield, N. H.

Pennsylvania.—W. E. Fraser has been appointed Division Freight Agent, Philadelphia & Erie Division, with office at Williamsport, Pa., vice Samuel L. Seymour, promoted, and C. H. Seymour has been appointed Freight Agent at Buffalo, N. Y., vice W. E. Frazer, promoted. Mr. Seymour will temporarily perform the duties of Freight Agent at Rochester, N. Y.

Pennsylvania Co.—At the annual meeting of the company held in Pittsburgh last week, the following directors were elected: G. B. Roberts, J. N. McCullough, Thomas D. Messler, James McCrea, Henry H. Houston, Wistar Morris, Frank Thomson, Henry D. Welsh, J. N. DuBarry, John P. Green, Wm. H. Barnes, Amos R. Little, S. P. Shortridge.

Pennsylvania Lines West of Pittsburgh.—J. H. Luce, for ten years chief clerk of the passenger service at Chicago, has been promoted and appointed Assistant General Passenger Agent, in place of C. W. Adams, who has resigned that position to engage in other business. His office will be at No. 65 Clark street, Chicago.

Peoria & Pekin Union.—Joseph Ramsey, Jr., of Cincinnati, Assistant to the President of the Cleveland, Cincinnati, Chicago & St. Louis, was last week elected President of this company. W. S. Cook has been elected Vice-President.

Peterboro & Hillsboro.—The annual meeting was held at Concord, N. H., May 29, and the following Board of Directors was elected: A. W. Sulloway, George E. Todd, J. C. Campbell, Wyman Pattee, William Power Wilson, Seth M. Richards and Enoch Gerrish.

Philadelphia & Reading.—A. J. Speese, Transportation Master having resigned, O. W. Stager, formerly Assistant Transportation Master, has been appointed to the position.

Portland, Saco & Portsmouth.—At a meeting of the directors of the road held at Portsmouth, N. H., June 4, the following officers were elected: President, Samuel C. Lawrence, Medford, Me.; Vice-President, Frank Jones, Portsmouth, N. H.; Treasurer, Edward Lesley, Boston, Mass., and Clerk, F. R. Barrett, Portland, Mo.

Portsmouth, Great Falls & Conway.—The following officers were elected at a meeting of the directors held at Portsmouth, N. H., June 4: President, Samuel C. Lawrence, Medford, Me.; Vice-President, Frank Jones, Portsmouth, N. H.; Treasurer, Edward Lesley, Boston, Mass.; Clerk, Wallace Hackett, Portsmouth, N. H.

Quincy, Keokuk & Chicago.—The incorporators and first Board of Directors are: George W. Kretzinger, Charles Gibson, A. Cread and C. R. Arnold, of Chicago; C. A. McLaughlin, of Warsaw, Ill., and James M. Bishop, of Quincy.

St. Catherine's & Niagara Central.—D. D. McTavish has been appointed General Freight and Passenger Agent of the road, with headquarters at St. Catherine's, Ont.

St. Louis, Alton & Terre Haute.—C. F. Parker has been appointed Assistant to the General Manager, and will have charge of the supply department.

San Antonio & Aransas Pass.—G. A. Imhoff has been appointed Traveling Freight and Passenger Agent of this company, with headquarters at San Antonio, Tex., vice W. E. McDonald, promoted.

Shuswap & Okanagan.—The officers of this company are: President, Capt. P. Larkin, of St. Catherine's, Ont.; Secretary, Mr. Lumly of Enderly B. C. and Chief Engineer, C. E. Perry, Mem. Inst. C. E., of Victoria B. C.

Tennessee, Arkansas & Texas.—At a meeting in Little Rock, Ark., June 13, the following board of directors was elected: John D. Adams, John G. Fletcher, Isaac Wolf, Z. Ward and James R. Miller, of Little Rock; H. L. Brinkley, Napoleon Hill and John Overton, Jr., of Memphis; W. J. Little and C. N. Rix, of Hot Springs; Judge D. H. Scott and J. H. Johnson, of Paris, Tex.

Texas & Pacific.—S. F. Judy having resigned to accept the position of General Manager of the Pecos Valley road, J. B. Paul has been appointed Acting Superintendent of the Rio Grande division, with headquarters at Big Springs, Tex. Mr. Paul was promoted from the position of trainmaster of the Transcontinental division. He has been with the Texas & Pacific about six years.

Toledo, St. Louis & Kansas City.—L. C. Cook has been appointed Traveling Freight Agent of the road, with headquarters at Cleveland, O. He has been in the Freight Claim Department of the Lake Shore & Michigan Southern road for the past 10 years.

The annual meeting of the stockholders was held in Toledo June 11, and resulted in the election of the following Board of Directors: Robert Harris, H. O. Armour, Charles Tag, Joseph S. Stout, W. Howard Gilder, J. M. Quigley, J. C. Havemeyer, Robert G. Ingersoll, F. L. Rust, of New York; S. R. Callaway, Clarence Brown, Toledo; W. R. Patton and H. A. Neal, of Illinois. The only change of importance was the election as new members of Robert Harris, ex-President of the Northern Pacific road, and H. O. Armour, brother to P. D. Armour, of Chicago.

Ulster & Delaware.—At a meeting of the stockholders, held at Albany, N. Y., last week, the following directors were elected: Edwin Young, Robert C. Pruyn, and Horace G. Young, Albany; C. C. Clark, William A. Read, J. D. Layng, Alfred Van Santvoord and Joseph Cornell, New York; H. C. Soop, Roxbury, N. Y.; David Winnie, Samuel G. Dimmick, T. C. Hornbeck and Charles Bray, Rondout, N. Y. Edwin Young was elected President, R. C. Pruyn, Vice-President; S. G. Dimmick, Secretary, and A. Benson, Treasurer.

Union Pacific, Denver & Gulf.—The office of Trainmaster on the Denver, Leadville & Gunnison has been abolished. John McCormie, the present Superintendent of Transportation and Telegraph of the Denver, Texas & Fort Worth has been appointed Trainmaster of the Colorado division.

Wabash.—J. F. McCarthy has been appointed General Agent for the Pacific Coast, with headquarters at San Francisco, vice J. H. Woodward, resigned.

Winona & Southwestern.—At the annual meeting of the road held at Winona, Minn., officers were re-elected as follows: H. W. Lambertson, President; V. Simpson, Vice-President; Thomas Simpson, Secretary; M. G. Norton, Treasurer. The following directors were elected for three years: H. W. Lambertson, V. Simpson, E. S. Youmans, and Joseph Walker, Jr., of New York.

Wolfboro.—The Directors of this road elected the following officers at a meeting held at Portsmouth, N. H., June 4: President, Samuel C. Lawrence, Medford, Me.; Vice-President, Frank Jones, Portsmouth; Treasurer, Edward Leslie, Boston, and Clerk, John C. Peavey, Wolfboro, N. H.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Abbeville & Waycross.—Tracklaying is now in progress on this road and has been finished from Abbeville, Ga., south to House Creek, a distance of 13 miles, and it is expected to finish the line to Swan, a few miles further on, in a few days. F. C. Hand, of Abbeville, is Chief Engineer.

Alabama, Georgia & Florida.—This Company, already chartered in Georgia and Florida, filed articles of incorporation in Alabama this week. The charter gives the terminal points of the Alabama division as Birmingham on the northwest, and Jernigan, in Russell county, on the southeast, and on the Chattahoochee river, Russell or Lee county, opposite Columbus, Ga. The line will pass through the towns of Hatchabubbee, Tuskegee, Rockford, Columbus and Bessemer. The proposed road is about 200 miles long. The capital stock is \$3,000,000. The surveys were made about a year ago between Quincy, Fla., through Bainbridge and Cuthbert, Ga., to Columbus.

A survey is now being made under W. S. Green, of Columbus, Chief Engineer, and John L. Cowan, Assistant Engineer, between Cuthbert and Jernigan, Ala., 40 miles. From that place the road is projected to Birmingham via Shelby City, 175 miles, and thence westward to Corinth, Miss., 175 miles. This would give a route from Quincy, Fla., to Corinth, Miss., of 490 miles.

Allegany & Kinzua.—The contract for grading the line to connect the Pennsylvania and New York divisions of this road has been let to P. S. Page, of Scranton, Pa. The line will extend from Gilbert, Pa., to Frecks Mills, N. Y., a distance of 10 miles. Of this the section between Gilbert and Johnson's Mills, 2½ miles, has been completed. The company has surveyed about 30 miles of branches and extensions, and will probably place the lines under contract before the end of the year.

Altoona & Wapasonock.—The contract for grading this line has been let to McGovern Bros., of Tyrone, Pa., and they have begun the construction with a force of 200 men. This road will extend from the city of Altoona, Pa., to a point on the Cresson & Clearfield road at Fallen Timber. The length of line to be completed at once is 15 miles. The survey has been made by W. T. Forsythe, Chief Engineer. It is expected to have the first nine miles of road completed by Aug. 1. This will enable the company to reach the Wapasonock summer resort, where it will do a large passenger traffic during the present season. The road will then be extended into the bituminous coal fields of northwest Cambria County. When completed it will afford a short and direct outlet from the bituminous coal field of Cambria, Clearfield and Indiana counties. Building stone and sand, as well as timber, will compose the principal traffic. The capital stock at present is \$75,000, but it will be increased as the road progresses. The larger portion of the stock has been subscribed and paid up. F. G. Patterson, of Altoona, is President.

Anniston & Atlantic.—The narrow gauge road between Anniston and Sylacauga, Ala., 53 miles, has been changed to standard gauge for a distance of 30 miles, and standard gauge trains will probably be running over this part of the line in a few days.

McDonald & Campbell, of Anniston, Ala., the contractors for the extension from Sylacauga to Shelby, Ala., have put a large force on the work. The grades are 48 ft. per mile, and the curves are four degrees. There will be one iron bridge over the Coosa River 800 ft. long.

Beaver & Ellwood.—The contracts for building this road between Ellwood and Ellwood Junction, Pa., a distance of three miles, has been let to a company called the Pittsburgh Company. The road is one of several recently incorporated in Pennsylvania to build short branches and cut-offs of the Pittsburgh & Western.

Bowling Green & Northern.—A small force is now being employed on the grading of this road near Bowling Green, Ky. The company expects the entire line from Bowling Green to Falls of Rough, 45 miles, under contract by July 1. The work will probably be let to Mason, Hoge & Co., of Frankfort, Ky.

Bristol Belt.—McDonald, Shea & Co., of Knoxville, Tenn., have been awarded a contract for building this belt line at Bristol, Tenn.

Buffalo Dock & Connecting.—This company has filed a map of its proposed road in the County Clerk's office at Buffalo, N. Y. The line is to begin at the east end of the Hamburg Canal and extend along the berme bank of the canal to near Hudson street, where it crosses to the lake side of the canal and follows the dividing wall between the canal and the harbor to Black Rock, where it again crosses the canal to the opposite side and continues to the city line on the high ground. Connections will be made with the Lehigh Valley at Washington street, and with the Grand Trunk and Erie at Black Rock. The contract for building the line is said to have been let to Ryan & McDonald, of Baltimore. The company is understood to have purchased the land lying under water in the lake between Jersey and Georgia streets, and plans have been made for its improvement. The plans provide for a series of 14 piers, all of which will be connected with the new road. The company controlling these docks is to be known as the Buffalo Pier, Elevator and Terminal Railroad Co. The piers will extend 900 ft. into the lake. The first one at Georgia street will be 150 ft. wide and on it a coal trestle will be built. Pier 2 will be 15 ft. wide, and upon it will be built a large elevator. Piers 3, 4, 7, 10, 12 and 14 will be 100 ft. wide; Piers 5, 6, 9 and 13 will be 150 ft. wide; Pier 8, 75 ft. wide; Pier 11, 125 ft. wide. John C. Sheehan, of Buffalo, is one of the projectors. George A. Ricker, of Buffalo, is Acting Engineer.

Burlington & Missouri River.—The company proposes to build a belt line at Lincoln, Neb., about three miles long, for freight and switching purposes, if it can secure the right of way. There is some apprehension that some of the property owners may not accept the terms proposed by the company. The line from West Lincoln to Havelock is expected to complete this year. The route will begin at a point on the main line of the Burlington & Missouri River road near the Fremont, Elkhorn & Missouri Valley crossing, and will follow Salt Creek, crossing it by a bridge near the state fair grounds.

Camden & Atlantic.—The company is laying a second track between Haddonfield and Berlin, N. J., a distance of 10 miles. Smith & Hoppock, of 1517 North Sixteenth street, Philadelphia, have been awarded the contract for the work.

Camden County.—The address of J. Alfred Bodine, the contractor for the grading on the branch between Mt. Ephraim and Spring Mills, N. J., which was omitted last week, should have been given as Camden, N. J.

Canadian Pacific.—Tracklaying on the Souris branch has been completed from Kennay, on the main line, to Menteith, Man., on the Souris River, a few miles southwest of the town of Souris, this branch to be continued to Melita and thence westerly to a point about 100 miles from Kennay. Branches will be built from Melita easterly to Deloraine, and from a point north of Melita to Glenboro. These two branches will aggregate 185 miles of road. The company will issue four per cent. bonds on the line to the amount of £4,000 per mile.

The suit of John Ross for \$50,000, which he claimed was a balance due him for constructing the western lines of the road, and the counter-suit of the company for \$2,000,000 for alleged damages resulting from mismanagement in the construction of the sections, have been amicably settled, and the suits discontinued. It is stated that the company has agreed to pay Mr. Ross \$50,000, and that they withdraw the charges made against him in relation to the matter.

Hugh Keefe is said to have the contract for the line from Revelstoke, B. C., to the Columbia River and Kootenai Lake.

Cape Fear & Cincinnati.—The Massachusetts Construction Co. has been recently organized to build this road and has been awarded the contract for the divisions between Wilmington & Southport, 25 miles, and between Southport and Salisbury, N. C., 106 miles.

Cape Fear & Yadkin Valley.—The branch from Millboro to Ramseur, N. C., a distance of nine miles, has been completed and opened for traffic. The two-mile branch from Mt. Airy, N. C., to the granite quarry at Flat Rock, N. C., has also been finished. Work is making rapid progress on the branch from Mt. Airy south to the Virginia state line where connection will be made with a branch which the Norfolk & Western is constructing.

Chicago, Baraboo & Northern.—The company has been incorporated in Wisconsin to build a road from Jefferson through Baraboo to Kilbourne City, a distance of about 75 miles. Frank Avery, D. E. Welsh and others, of Baraboo, are incorporators. The capital stock is \$500,000.

Chicago, Milwaukee & St. Paul.—The company has now under construction a line from Needah north along the Yellow creek to Remington, Wis., 19 miles, and also from Lynn, north a distance of about four miles. The contracts have been let to S. A. Harrison & Co., of Milwaukee, and Kimball & McNamara, of Sioux City, Ia. The line from Lynn will probably be continued 15 miles further north, from the terminus of the present contracts. S. A. Harrison & Co. have sublet their contract to T. S. Lloyd & Co., of Depeere, Wis., and Allen McDougall & Co., of Mankato, Minn.

Chicago & West Michigan.—The tracklaying on the Traverse City extension from Baldwin north to Traverse City, Mich., 74 miles, has been completed. Of this distance the 37 miles from the Manistee River to a point eight miles south of Traverse City, were completed this year. The branch from Holland to Ottawa Beach, 7½ miles, has also been finished. John Fitzgerald & Bro., of Lincoln, Neb., were the contractors for the extension to Traverse City, and McDonnell Bros. & Co., of Grand Rapids, had the contract for the Ottawa Beach branch.

Columbia, Geneva & Western.—The survey is now being made between Geneva and Columbia, Ala., about 50 miles. The route crosses the Alabama Midland between Dothar and Ashford.

Concord & Montreal.—The Lake Shore road, which was built last year from Lake Village to Alton Bay, N. H., a distance of 17 miles, will be placed in operation June 17.

Coos Bay, Coquille & Coast.—This company has been chartered in Oregon to build a road from Marshfield, Coos County, to the head of the Coquille River. George U. Holcomb, C. B. Tower, John A. Gray, are incorporators. The capital stock is \$200,000, and the principal office will be at Marshfield.

Delaware & Hudson Canal Co.—About 200 men are working on the second track between Saratoga and Fort Edward, N. Y., a distance of 17½ miles. Five miles of the track has been laid on the 11-mile section between Saratoga and Gansevoort. The grade of the road between these points is being reduced from 53 ft. per mile to 36 ft. The maximum curves will be five degrees. The contract for the grading, masonry and bridges between Gansevoort and Fort Edward, six miles, has been let to the Hilton Bridge Construction Co., of Albany. The contract includes the erection of 10 spans of iron deck and three truss bridges to replace through single track structures. The bridges will be raised about three feet. All the work is to be completed by Nov. 1 next.

Delaware & Otsego.—Work has been discontinued on this road, which is an extension of the Ulster & Delaware, and it is not known when the grading or tracklaying will be resumed. The road is completed from Hobart to Bloomville, nine miles, and 20 miles has been graded from Bloomville to West Davenport, N. Y. Francis Curnan, of Rhinebeck, N. Y., is the contractor.

Denver, Texas & Fort Worth.—The short branch from Victor, Col., to the mines, about a mile distant, has been finished. The company has at present two lines under contract, one from Martinsen, Col., to Red River, 15 miles, and from Road Junction to Mine No. 3, a distance of three miles. J. R. De Remer, of Trinidad, Col., has the contract for both lines. A survey is now being made for a further extension of the Martinsen line along the Red River for about 15 miles.

Florida Midland & Georgia.—The preliminary surveys have been completed between Valdosta, Ga., and Deadman's Bay, Fla., on the Gulf of Mexico, a distance of about 90 miles. The locating survey is now being made from the Florida state line, and as soon as it has been finished it is proposed to place under contract the section from the Florida line to the terminus on the Gulf of Mexico. The work of repairing the grade between Valdosta and the Florida state line will be begun within a few days, and pushed to completion as rapidly as possible. W. B. Thomas, of Tennille, Ga., is General Manager.

Goodyear, Neilsville & Northern.—The company has under construction a line from Goodyear, on the Chicago, Milwaukee & St. Paul, northwesterly a distance of about 12 miles to Millston, Wis. The tracklaying has been begun, and is about completed on the first five miles.

Grand Rapids, Chicago & St. Louis.—The survey of this road has just been completed from Grand Rapids to Benton Harbor, on Lake Michigan. The line will probably be operated by the Grand Rapids and Indiana when built. Charles C. Temple, of Grand Rapids, Mich., is Vice-President.

Great Falls & Canada.—Egan Bros., of Winnipeg, have put a force of about 75 men at work on the Manitoba division of this line near Lethbridge, grade south from that point to a connection with the line now being built north from Great Falls, Mont.

Great Northwest Central.—At a meeting of the stockholders in Ottawa last week A. Codd, Secretary of the company, stated that an issue of land grant bonds to the amount of \$500,000 had been negotiated by him during a recent visit to London. Arrangements had also been completed to put under contract this year an additional 100 miles of road, which it is expected to complete before January.

Huntington & Big Sandy.—The City Council of Huntington, W. Va., has granted right of way through the city to this road which is to extend from Huntington to the mouth of the Big Sandy River.

Indiana & Lake Michigan.—It is now expected that this line will be placed in operation on June 20 between South Bend, Ind., and St. Joseph, Mich., a distance of 40 miles. The road will be operated by the Terre Haute & Logansport division of the Terre Haute & Indian

apolis. It was completed last year, but the ballasting and other matters have delayed the opening.

Indiana Mineral Springs.—Articles of association have been filed with the Secretary of State of Indiana by this company, with a capital stock of \$500,000. The proposed road is to be forty miles long, and will extend from Taswell through French Lick, West Baden, Trinity and Indiana Springs, where it connects with the new Evansville & Richmond, by which it will be operated.

Jacksonville Southeastern Line.—The tracklaying on the St. Louis division has been completed from a point near Edwardsville to Wordem, Ill., on the Wabash road, a distance of 11 miles. E. M. Collins, of Kirksville, Mo., has the contract for the entire line between Edwardsville and East St. Louis, 49 miles.

Johnson City & Carolina.—Construction work has been commenced on this branch of the East Tennessee, Virginia & Georgia, which is to extend from a point on its line about two miles west of Johnson City, to Bumpass Cove Creek, three miles south of Embreeville, Tenn., a distance of 15 miles. The maximum grade is 66 ft. per mile, and the maximum curvature is four degrees. Purdy & Rexford, of New York City, are the contractors. Cary A. Wilson, 80 Broadway, New York City, is President, and Gouverneur Morris, Johnson City, is Chief Engineer.

Johnsonville & Rutland.—The articles of incorporation of this company were filed in New York this week. The road is to be constructed and operated from Johnsonville, Rensselaer County, to Granville, Washington County, and will be 46 miles in length. Among the incorporators are: George Hill, Henry M. Blanchard, Henry M. Polhemus, Cornelius V. Sidell, A. H. King and William H. Wiley, of New York City. The capital stock is \$1,000,000.

Kansas City Circular.—One of the officers of the company states that it is now prepared to receive bids for building the road, which is to be a belt line around Kansas City, Mo., about 16 miles long. J. J. Spencer, of Kansas City, Kan., is Secretary.

Kentucky Roads.—Bills to incorporate the following roads have passed the State Legislature: Jellico, Beattyville & Ashland; Paducah, Nashville & Charleston, and the Lexington & Eastern.

Lancaster & Hamden.—E. P. Buell & Co., of Tarlton, O., who are building this line, have let the contract to Carnegie Brothers, of Pittsburgh, for the rails for the road from Columbus to the Ohio River, 100 miles, and the branch to Wellston, 24 miles, through the coalfields of southeastern Ohio. The angle bars and spikes are furnished by the Springfield Iron Co. Work is being rapidly pushed on the line, with the expectation of completing it to the connection with the Columbus, Lima & Milwaukee, at Columbus, this year.

Lehigh Valley.—Recent press dispatches from Philadelphia have frequently mentioned that the company was surveying an extension 58 miles long from Bethlehem to Philadelphia, parallel to the Philadelphia & Reading, whose tracks between the two points are now used. It was stated this week that arrangements had been concluded by which the Lehigh Valley secures from the Pennsylvania the right to use its freight and passenger terminals in Philadelphia. The two surveys which have been made for the new line are said to extend from Bethlehem to Doylestown over the same route. Thence one survey takes a direct line to Spring Mill, near Conshohocken, on the Schuylkill Valley division of the Pennsylvania, crossing the North Penn at Pennlyn. The other route runs from Doylestown to Frankford, where it connects with the Pennsylvania road and continues to the vicinity of Cramp's shipyard.

Lynchburg & Durham.—The tracklaying has now been completed from South Boston, Va., to Flat River, N. C., a distance of 29 miles. Work is now in progress south to the southern terminus of the road at Durham, N. C., a distance of 53 miles from South Boston. Codwise & Allen, of Rockville, Md., and Roanoke, Va., have the contract for tracklaying on this section. A survey is now being made from Durham to a connection with the Raleigh & Augusta road, a distance of 25 miles. R. Taylor Gleaves, of Lynchburg, is Chief Engineer.

Macon & Atlantic.—J. S. McTigue & Co. will commence to let sub-contracts on June 15 for the construction of 185 miles of road from Macon, Ga., east. Profiles and specifications can be seen at their Macon office, or at 271 Front street, Memphis, Tenn.

The surveyors are running the location between the Georgia state line and Birmingham, and are now between the Coosa River and Birmingham. The survey has been made as far as the river, and will be finished within the next two weeks. The line passes through Roanoke, Talladega and Leeds. Work on the eastern end of the road is still being pushed. Much new rolling stock has been received of late, and 30 miles of the road west of Macon will be in operation in a short time. It is reported that nearly 2,000 men are at work. Grading on the Savannah extension of the road out of Macon has begun.

Michoacan & Pacific.—The locating survey for the extension from the present terminus to Zitacuaro, Mexico, a distance of about 25 miles, is now being made by W. C. Ames, locating engineer. The maximum grade is 2.5 per cent. The work on the extension as far as located is quite light. The road is now in operation between Maravatio and La Junta, a distance of about 30 miles. Arthur P. Herbert, of Maravatio, is Chief Engineer.

Middle Georgia & Atlantic.—The residents of Sandersville and other points in Washington County, Ga., are endeavoring to secure the right of way through the county for the projected Savannah extension of the line and to obtain subscriptions to a subsidy of \$100,000 to secure the construction of the road from Linton, in Hancock County, to Sandersville.

Millen & Southern.—J. M. Willis, of Thrift, Ga., has been awarded the contract for grading the section of road from Thrift northeasterly to Millen, Ga., on the Central of Georgia road, a distance of 11 miles. The town of Millen is to be the northern terminus of the road, and when it has been completed to that point the line between Thrift and Rogers will probably be abandoned. The contracts for about 20 miles of the southern extension of the road from Summit to Stirling, Ga., will probably be awarded in a short time. The survey has already been made.

Missouri, Tennessee & Georgia.—E. P. Buell & Co., of Tarlton, O., have let the contract for building the road to Robinson, Brickley & Co., of Missouri. Work will be commenced on the line about Aug. 1, and will be completed this year.

Mobile, Jackson & Kansas City.—An election will soon be held in Jackson, Miss., to vote on a proposition to subscribe \$55,000 to the proposed stock of this company, payable in 20-year four per cent. county bonds. The company has already been voted a subsidy of \$250,000 by the city of Mobile, Ala., for the road between that place and Jackson, a distance of 183 miles.

Mount Jewett, Kinzua & Rittville.—A third track is being laid between Mount Jewett and Camp Halsey, Pa., a distance of about five miles. The rails are being laid alongside the present narrow gauge track, and when the work has been completed standard gauge trains will be run between the two points.

Nashville & Knoxville.—The extension from Buffalo Valley to Cookeville, Tenn., a distance of 22 miles, has been completed. Trains are now running to a point within five miles of Cookeville and a regular schedule will probably be arranged in a few days for the entire distance between Lebanon and Cookeville, about 50 miles. J. C. Rodemer & Co., of Gallatin, Tenn., had the contract for the section between Buffalo Valley and Cookeville.

Newfoundland.—A press dispatch from St. John's states that Middleton & Reid have secured the contract to build 250 miles of the government railroad on this island at \$15,500.

New Orleans Union.—The Texas & Pacific, Illinois Central, Southern Pacific, Louisville, New Orleans & Texas, and New Orleans & Northeastern roads have formed the New Orleans Union Railway Co. for the purpose of building a belt road connecting the railroads in the city of New Orleans, and giving them better connections with the commercial and industrial enterprises and river and marine shipping.

New Roads.—An election was held in Caroline County, Md., June 3, at which it was voted by a large majority to subscribe \$60,000 in county bonds to aid the construction of a proposed railroad through Caroline County from Greensboro south to Federalburg, Md., a distance of 22 miles, and connecting the Cambridge & Seaford and Delaware & Chesapeake Divisions of the Pennsylvania. If the road is built it will be operated by the latter company.

A survey is being made from Keathy, Tenn., on the Cincinnati Southern, easterly along the Tennessee Valley to Lenoir, on the East Tennessee, Virginia & Georgia, and to a point on the Knoxville Southern, near Niles Ferry, a distance of about 30 miles. The line will cross the Emory, Tennessee and Little Tennessee rivers. It is stated that the East Tennessee, Virginia & Georgia has agreed to operate it when completed.

Maj. Geo. H. Bonebrake and John Byson, Jr., of Los Angeles, Cal., propose to build a road from Pasadena to the top of Wilson's Peak. The road will be 12 miles long, with a grade of 7½ per cent. The estimated cost is \$300,000.

New York Central & Hudson River.—It is expected to have the third track on the Hudson River division completed from Spuyten Duyvil to Yonkers, N. Y., by August 1. Four hundred men are working on it between Spuyten Duyvil and Sing Sing, and it is believed that the entire division will be completed this season.

New York, Providence & Boston.—The company is now completing, in connection with the Old Colony, a four-track road on its Boston and Providence Division, between Providence and Pawtucket, R. I., four miles. The line between these points is already a double track road, and the third track is now about completed.

Northern Pacific.—It was reported in some of the Eastern papers this week that the company had finally secured control of the Seattle, Lake Shore & Eastern road, and that it would assume all the obligations of the outstanding stock and bonds. The sale is understood to include the division from Spokane Falls west to Davenport, Wash., as well as the eastern division and the northern branch as far as completed. The company has a valuable franchise from the city council of Seattle giving it a right of way along the water front in that city which practically excludes other roads building to the wharves without securing the consent of the company.

President Oakes, of the Northern Pacific, has since denied the correctness of the report, and stated that it probably arose from the fact that an agreement has been made with the Seattle, Lake Shore & Eastern for the formation of a belt line which will encircle Seattle and Lake Washington on the outskirts of the city. Under this plan there will be about 50 miles of railroad built, which will be operated jointly by the companies. The Northern Pacific is to build 22 miles in order to perfect this belt line. It is a small and inexpensive undertaking, the object being to reach the industries which are growing up about Seattle and along the shores of the lake.

Northern Pacific & Idaho.—This company was incorporated in Washington last week by officers of the Northern Pacific to build a road from a point on the Spokane & Palouse road in Whitman County, Washington, in an easterly direction to the Idaho line, in the County of Latah, and thence by way of Moscow and Cornwall, and the west fork of Bear Creek and Big Potlatch Creek to the town of Julietta; thence down the Clearwater River to its confluence with the Snake River, and to the town of Lewiston, in Nez Perce County; up Snake River, Tammany Creek and More's Creek to Lake Walla, in Nez Perce County, an estimated length of 91 miles. The capital stock is \$2,000,000.

Old Colony.—A special meeting of stockholders was held in Boston last week, and the directors were authorized to pay for the construction of the road from Dedham to Walpole, giving the road a through line from North Attleboro to Boston, from the funds in the treasury. The line will be about 10 miles long, and will cost, without grade crossings, about \$500,000.

A hearing by the Hyde Park selectmen was held this week on the petition of the road for a location through Hyde Park of a connecting line between the station at Mattapan and the Providence division near Clarendon Hills station. The plan contemplates crossing Blue Hill avenue at grade at Mattapan, a bridge over East River street near the Mattapan and Hyde Park line, and also overhead bridges over Hyde Park avenue. The latter is necessitated by the fact that it requires a Y to strike the Providence division in order to run circuit trains.

Pacific Short Line.—John Scullin & Co., of St. Louis, who have the contract for building the line between O'Neill, Neb., and Ogden, Utah, will sublet the work in sections of 50 miles after June 15. The 50-mile sections will probably also be sublet.

E. P. Reynolds & Co., who have the contract for tracklaying between Covington and O'Neill, 127 miles, have completed the first 70 miles and are finishing the work at the rate of about two miles a day.

Pittsburgh, Akron & Western.—McCracken & Semple, of Allegheny, Pa., who have the contract for building the line between Akron and Carey, O., a distance of 107 miles, have sublet the work to Creech & Lee, of Akron, and Neal, Norton & Co., of Plymouth, O.

Pittsburgh, Canonsburg & State Line.—McCully & Taylor, of Pittsburgh, have about completed the preliminary survey of the road from Pittsburgh to Canonsburg, Bethany and Wheeling, a distance of 66 miles. The line begins on the lower side of Carson street, Pittsburgh, and just above the south end of the Smithfield street bridge. From there it will pass through a tunnel under Mt. Washington, which will enter the hill near the Panhandle Railroad station and will make its exit on the other side near the Bell tavern. This tunnel will be about a mile long.

Plymouth & Bournedale.—At a town meeting held in Plymouth, June 7, the town voted to subscribe \$70,000 to the capital stock of this road. Horace B. Taylor, of Boston, is largely interested. B. F. Hancox, Sr., of Hudson, Mass., is Chief Engineer.

Port Edwards, Centralia & Northern.—W. G. Scott, of Merrill, Wis., has been awarded the contract for grading this road from Port Edwards north through Woods County, to Marshfield, Wis., on the Wisconsin Central, a distance of about 30 miles.

Quincy, Keokuk & Chicago.—This company previously referred to as the Quincy, Keokuk, Nanvoo & Fort Madison filed its articles of incorporation in Illinois this week. The road is to extend from Quincy, Ill., to Niota, Hancock County, Ill., and from Keokuk, Ia., to Hamilton, Hancock County. The capital stock is \$1,500,000.

Richmond & Danville.—Tracklaying on the extension of the Western North Carolina to Murphy, Tenn., is now in progress between Westfield and Haysville, a point about five miles east of Murphy.

Savannah, Americus & Montgomery.—King & Hennen, of Montgomery, Ala., who have been previously credited with having the contract for grading on one of the sections of the extension from Louvale, Ga., to Montgomery, have been awarded the contract for grading 90 miles of the distance between these points. The contract for the trestles on the division has been let to A. R. Coulter & Co.

Shuswap & Okanagan.—This road is to extend from Sicamous, B. C., on the Canadian Pacific south via the Shuswap River and the Spillenechee Valley to the head of Okanagan Lake, a distance of 51 miles. It will pass through Enderly and Vernon, and connect at the latter place with the Kootenay & Okanagan. Riley & Co., of Victoria, have the contract for grading, as already stated. On about 15 miles the work will be heavy in rock and cement. Twenty miles will be moderately heavy earth and cement work. The remaining 15 miles will be light work. The maximum grade is 52 ft. per mile and the maximum curve is nine degrees. During construction the headquarters of the company will be at Enderly, B. C. The general office is at Victoria, B. C. C. E. Perry, Mem. Inst. C. E., is Chief Engineer.

South Brunswick & Calahan.—This company has applied for a charter for the purpose of constructing a road from South Brunswick to Calahan, Fla. James B. Scott, Henry R. Symons, John E. du Bignon, J. M. Madden are interested.

Temiscouata.—The contract has been let to Malcolm & Ross for building the St. Francis branch from Edmundston to the St. Francis River, N. B., a distance of 36 miles.

Tennessee, Arkansas & Texas.—The subscriptions to the capital stock of the construction company which proposes to build this road now amount to \$240,000, as follows: Paris, Tex., \$60,000; Hot Springs, \$50,000; Little Rock, \$130,000. The construction committee cannot be organized until \$500,000 has been subscribed.

The Dalles, Goldendale & Northern.—This company filed its charter in Oregon last week. Surveys have been in progress for some time on the line, which is to extend from The Dalles city to a junction with the Northern Pacific near Kennewick, Wash. The principal office will be at The Dalles, Or. The capital stock, \$250,000. O. D. Taylor, J. J. Fish, George W. Fillon and Robert Mays, are the incorporators.

Three Forks Belt.—This recently organized Kentucky road proposes to construct a belt road line Beattyville to Three Forks City.

Union Pacific.—A large force is at work on the standard gauging of the Utah & Northern division, and the six miles between McCammon and Arima, Utah, have been completed. In some places an entirely new roadbed has been constructed, and a large number of curves of the present line have been otherwise eliminated.

Victoria, Port Crescent & Chehalis.—This company has filed articles of incorporation in Washington with a capital stock of \$4,000,000. The incorporators are: Paul Schulze, T. Luppe, E. N. Castillo, H. S. Huson and James M. Ashton, of Tacoma.

Wadley & Mt. Vernon.—It is stated that construction work on the extension to Mt. Vernon, Ala., will soon be resumed.

Walhonding Valley.—The surveys have been completed for this line between Kimbolton and Loudenville, O., a distance of 68 miles. Much of the right of way has been secured and it is expected that the line will be put under contract very shortly. The principal obstacle to the early commencement of construction is the inability of the company to obtain the deeds for 25 miles of right of way along an old canal towpath. The matter is now in litigation and the company expects that a decision will soon be made which will give it authority to acquire the right of way. A. J. Warner, of Marietta, O., is President, and J. A. Hanlan, of Canton, O., is Chief Engineer.

Western Maryland.—A survey has been recently made by this company for a branch from Arlington Station, Md., to Colegate Creek, a distance of about 10 miles.

Woonsocket & Pascoag.—The construction of this old road is to be recommenced at once. The project was formerly embraced in the Boston & New Haven Air

line, and is partly graded. E. G. Sweatt, of Woonsocket, R. I., is interested. B. F. Hancox, Sr., of Hudson, Mass., is Chief Engineer.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals), and net earnings of the road and its auxiliary lines, for the month of April, were as follows:

	Gross earn.	Oper. exp.	Net earn.	Oper. mil/ge.
Roads owned and controlled.....	\$2,483,294	\$1,765,333	\$717,960	6.528
Roads jointly owned with other companies:				
Atchison's one half.....	158,524	129,136	29,389	582
Total.....	\$2,641,818	\$1,894,469	\$747,349	7.110

St. Louis & San Francisco:

	Gross earn.	Oper. exp.	Net earn.	Oper. mil/ge.
Roads owned and controlled.....	\$463,458	\$310,540	\$152,918	1.329
Roads jointly owned with Atchison Co.:				
Frisco Company's one half.....	156,517	122,306	34,211	526
Total.....	\$619,975	\$432,846	\$187,129	1.855

Aggregate, both systems, \$3,261,792 \$2,327,315 \$934,478 8.966

The comparative statement of all lines is as below:

Atchison System:

	Gross Earn.	Net Earn.	Per Mile.	Milage.
April, 1890.....	\$2,641,818	\$747,349	\$371.55	\$105.11
April, 1889.....	2,287,111	558,984	321.60	78.60
Increase.....	\$354,707	\$188,365	\$149.95	\$26.51

Frisco System:

	Gross Earn.	Net Earn.	Per Mile.	Milage.
April, 1890.....	\$619,975	\$187,129	\$334.15	\$100.86
April, 1889.....	549,304	170,927	296.06	92.12
Increase.....	\$70,671	\$116,202	\$38.09	\$8.74

Aggregated General System:

	Gross Earn.	Net Earn.	Per Mile.	Milage.
April, 1890.....	\$3,261,792	\$934,478	\$363.81	\$104.23
April, 1889.....	2,836,415	729,911	316.32	81.40
Increase.....	\$425,378	\$204,567	\$147.49	\$22.83

Central of Georgia.—A mortgage has been filed in Georgia by the company in favor of the Central Trust Co., of New York, for \$13,000,000, to secure that amount of consolidated five per cent. bonds. The mortgage covers the main stem from Savannah to Atlanta and the Milledgeville branch and also the equipment.

Chesapeake & Ohio.—The earnings and expenses of the road for the month of April, 1890 and 1889, were as follows:

	1890.	1889.	Inc.
Gross earn.....	\$591,000	\$407,000	\$184,000
Other expen.....	485,000	374,000	111,000
Net earn.....	\$106,000	\$33,000	\$73,000

Chicago & Eastern Illinois.—A receiver has been asked for in this Federal Court at Chicago for this road. The New York bondholders demand an accounting of the net earnings from 1884 to 1889. George Blagden and Adam W. Spies, of New York, the former the trustee under the income mortgage, filed the petition for a receiver.

Chicago & Northwestern.—The annual report for the year ending May 31, 1890, the month of May being estimated, gives these figures: Gross earnings, \$27,122,791; operating expenses, taxes, interest and sinking fund, \$23,051,071; net earnings, \$4,071,720; dividends, 7 per cent. on preferred stock, \$1,562,785, and 6 per cent. on common stock, \$1,832,194; total dividends, \$3,444,979; surplus, \$626,741; surplus of lines west of the Missouri River, \$81,312—total, \$708,062.

Cleveland, Cincinnati, Chicago & St. Louis.—A meeting of the shareholders will be held July 7, to vote on an issue of \$4,500,000 common stock, to authorize the issue of \$650,000 four per cent. bonds, to pay for the control of the White Water road; the issue of \$10,000,000 four per cent. 100-year bonds, to be secured by a collateral trust mortgage, for the purchase of the St. Louis, Alton & Terre Haute road; the proposed purchase or lease of a line, between Springfield and Columbus, O., or the building of an independent line, and the issue thereof of \$1,250,000 four per cent. bonds; the approval of the purchase of the stock of the Cincinnati, Wabash & Michigan Co., and to grant authority to guarantee interest on not more than \$3,000,000 four per cent. bonds of that company, and to approve the agreement with the Ohio & Mississippi road relative to the use of tracks between North Vernon and Jacksonville and New Albany, Ind.

Galveston, Harrisburg & San Antonio.—The Galveston, Houston & Henderson Co. has filed a suit against this road for \$133,000, the amount alleged due for the use of plaintiff's line which was used by defendants in entering the city of Galveston, Tex.

Indianapolis, Decatur & Springfield.—Justice Harlan, of the United States Court, of Chicago, is hearing arguments on a motion by the First National Bank of Indianapolis for an order instructing Henry B. Hammond, receiver of the company, to take possession of it again and surrender it under an order of court entered May 7, 1888, by which the bank will be placed in control of the road. Robert B. F. Pierce and Benjamin A. Sands are trustees under the first mortgage. The bank claims a lien for moneys advanced. The motion has been taken under advisement.

Mexican Central.—The directors at their meeting this week voted to pay three per cent. full interest on the first income bonds on July 1. The balance of the surplus of 1889 was appropriated for equipment, all of which has been ordered and part of it already delivered. The matter of the disposal of the subsidy was not discussed.

Milwaukee & Northern.—An officer of the company confirms the report that the Wisconsin Central is negotiating for the purchase of the Milwaukee & Northern. The company has obtained an option covering the entire line, and if the deal is consummated it will be within a few weeks, as the option expires at that time.

Morris & Essex.—The agreement between the state of New Jersey and the company respecting back taxes has been settled. The papers have been regularly executed on the part of the company, through its lessee, the Delaware, Lackawanna & Western, and the documents were filed with the Secretary of State this week. The company, by the agreement, surrenders its special contract of taxation and agrees to submit to all constitu-

tional general tax laws, and the state relinquishes its right to take the property of the railroad at an appraised valuation not exceeding cost. This arrangement gives general satisfaction. The state receives \$235,000 by the arrangement.

New York Central & Hudson River.—The Board of Directors have authorized the issue of \$15,000,000 4 per cent. debenture bonds, principal due in 1905. The object of this issue is to provide for the expenses of the depression of the tracks in the annexed district of New York City and those of the Port Morris branch, and other extensive improvements connected therewith, including the elevation of the Harlem River bridge and approaches thereto, as may be required by law; the laying of a third track on the Hudson River Division from Sing Sing to Spuyten Duyvil; and the depression and elevation of tracks to avoid grade crossings, and other terminal improvements contemplated during the next two years at Buffalo, and now partly under contract. In addition to the above, contracts have been made for very large additions to the rolling-stock and motive power of the company to meet the increasing requirements of the business. It is not anticipated that these bonds will all of them be sold, or the proceeds required, under three years. A sufficient amount of them, however, understood to be \$6,000,000, has been taken by Drexel, Morgan & Co., of New York, to meet the requirements of the current year.

Norfolk Southern.—The plan for the reorganization of the road, dated June 1, 1889, has been abandoned, and in its place a new plan has been formulated, which provides for the formation of a new company which will issue \$500,000 five per cent. 50-year bonds to acquire funds for the purchase of new equipment and for betterments and improvements; also \$2,000,000 new stock. Holders of existing first-mortgage bonds and first-mortgage interest funding bonds to receive new stock at par in exchange. Second-mortgage debenture bonds and second-mortgage interest funding bonds to receive in new stock at par 50 per cent. of the principal of their bonds, with the right to purchase at \$50 per share new stock to the amount of 50 per cent. of their bonds. Income bonds are entitled to purchase stock to the amount of 20 per cent. of the bonds at \$50 per share. Old common stock may purchase new stock, to the extent of 10 per cent. of the old, at \$50 per share.

Paducah, Tennessee & Alabama.—The company will hold a stockholders' meeting on Aug. 5 for the purpose of considering and voting upon a proposition to authorize the issuance of bonds to an amount not exceeding \$20,000 per mile, to be secured by a first mortgage on all its property.

Pennsylvania.—The annual report of the General Manager gives the following statistics for the year: On the Pennsylvania Railroad Division 17,799,407 passengers were carried, an increase of 164,940 over 1889; 32,408,198 tons of freight were moved, an increase of 3,007,839 tons. There was an average profit of .56 of a cent on each passenger per mile, and an average profit .225 of a cent on each ton of freight per mile. The cost of carrying each passenger per mile was 1.65 cents. On the United Railroads of New Jersey Division, total passengers carried, 20,205,975; increase, 1,485,944; freight tonnage, 13,701,833; increase, 1,051,250. It cost 1.372 cents to move each passenger one mile, which was a profit of .518 of a cent, and it cost 1.023 cents to move each ton of freight one mile, which was a profit of .155 of a cent. The anthracite coal shipments over the Belvidere Division amounted to 1,748,180 gross tons, an increase of 78,567 tons. There were 1,424,099 tons of bituminous coal shipped to South Amboy during 1889, or 460,271 tons less than were shipped during 1888. This decrease was owing to building a new coal pier at Harsimus Cove, and the shipment to that point of 719,696 tons of bituminous coal which would otherwise have been forwarded to South Amboy. Over the Delaware & Raritan Canal there were 1,276,269 tons of freight transported during 1889, a decrease of 110,712 tons. The total number of passengers carried on the Philadelphia & Erie Division was 2,184,611, an increase of 370,635. The freight tonnage was 12,263,408; increase, 1,109,378. The report speaks in detail of the damage done by the June floods of last year.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The company has made known the terms of the agreement of consolidation of the railroads of the Southwestern into the new company. The capital stock of the new company is to be issued in exchange for the outstanding capital stock of the constituent companies on the following basis: Pittsburgh, Cincinnati & St. Louis—One share of preferred stock of the new company for each two shares of first preferred or of second preferred; one share of preferred stock of the new company for two shares of common stock in payment of accumulated and unpaid dividends of first preferred stock, par for par, say of the common stock of the new company. Chicago, St. Louis & Pittsburgh—\$66.66 of the preferred stock of the new company for each \$100 of the old preferred stock, and also \$33.34 of common stock of the new company; common stock, par for par. Jeffersonville, Madison & Indianapolis—\$50 of the preferred stock of the new company for each \$100 of old stock.

Reading & Chesapeake.—There was placed on record in Reading, Pa., this week, a mortgage for \$2,000,000 given by the Reading & Chesapeake Coal & Railway Co. to the Farmers' Loan & Trust Co., of New York, as Trustees. The road is projected to extend from Reading to Havre de Grace, Md.

Shenandoah Valley.—Judge Olvey, of Maryland, has passed a decree, upon the application of the attorney for the general bondholders of the company and the attorney for the company, directing the sale of all the property and franchises of the company lying in Maryland. Decrees were recently passed by the Virginia and West Virginia courts, and this latter decree simply confirms and adopts the former.

Shreveport & Houston.—This road, which is the eastern end of the line extending from Houston to Shreveport, La., and from the latter city to Logansport, was sold this week under the decree of the United States Court for the sum of \$280,000. Joseph Richardson and E. C. Hawley, of New York, are the purchasers.

Ulster & Delaware.—At the annual election last week several of the directors of the West Shore and the Delaware & Hudson Canal Co. were elected directors of this company, and it is stated that the road will hereafter be operated jointly by the Delaware & Hudson Canal Co., and the West Shore. The late president of the road, Mr. Thomas B. Cornell, owned nearly the entire issue of bonds and stock. Since his death the executor of the estate has sold all the bonds and a portion of the stock to the Lincoln National Bank and J. D. Vermilye & Co., New York City.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, June 11, 1890.

The Chicago & Grand Trunk on Monday reduced the rates on dressed beef to 42 cents per 100 lbs. from Chicago to Boston and common New England points by way of Montreal. The reduction is without the concurrence of Chairman Blanchard, of the Central Traffic Association.

The Western Freight Association met yesterday and several attempts were made to act upon the restoration of rates, but no agreement could be reached. All the work of settlement was left to a committee, which will report as soon as possible.

An important alliance is that between the Northern Pacific and the Chicago, Milwaukee & St. Paul. A new passenger train is to leave Chicago at 5.30 p. m., arriving in St. Paul at 7 a. m. the next day, in time to connect with a new transcontinental train on the Northern Pacific, leaving St. Paul at 8.15 a. m. Returning, the train leaves St. Paul at 3 p. m. for Chicago. The time on the Northern Pacific has not been announced, but it is supposed it will be faster than the Portland train on the Northwestern and Union Pacific, which latter route has been making inroads upon the first-class travel of the Northern Pacific. The new arrangement is regarded as a confession of weakness for the Wisconsin Central.

President Roswell Miller, of the Chicago, Milwaukee & St. Paul, in an interview says that a settlement of rate difficulties can only be effected by a return to the pooling system, which, while not perfect, was the best plan devised for the end desired.

One effect of the absorption of the St. Louis & San Francisco was to turn to that road all the St. Louis traffic of the Atchison which could be controlled. This and the notice of refusal of prorating between Kansas City and Chicago shows that the Atchison officers feel the increasing strength of their position.

Judge Cooley, of the Interstate Commission, has written a letter to the general passenger agents of western roads calling attention to the large business done by scalpers and asking for an expression of views regarding effects, causes and possible remedies. He makes no new suggestions.

The passenger situation on the roads west of here has been disturbed by the allegation that a block of 500 Burlington tickets, from Kansas City to St. Louis, sold to Col. Scott, had been thrown on the market. This is vigorously denied and \$1,000 is offered for every one so found. Nevertheless the excursion rate will be kept open between those two cities by all the roads till June 16. Aside from this, the tariff rates went into effect June 9 as announced. Other roads have made small contracts at reduced rates. These have not stood in the way of a restoration of rates, but may prevent the adoption of a new passenger agreement.

The passenger men met again yesterday, and decided to go ahead under the agreement of the presidents to restore rates. J. F. Goddard, late Third Vice-President of the Atchison, was elected Chairman, and accepted the position. The new association will be known as "The Western Passenger Association." The agreement to restore rates is operative for at least 60 days, and the roads expect to complete an organization within that time.

Assistant General Manager J. F. Tucker, of the Chicago, Milwaukee & St. Paul, will, it is reported, be appointed Assistant to the President.

The Burlington has modified its application to the Western Freight Association for a 12½ cent cattle rate from Southwestern Missouri River points via all Burlington lines, and to-day gave notice of an intention to make a 15-cent rate from St. Joseph, grading up to 21 cents at Omaha, in order not to disturb the Omaha rate.

Reports that the Chicago & Grand Trunk has withdrawn from the Central Traffic Association are false. The road still presses its demand for the three cent differential, however.

Traffic Notes.

The Buffalo Weighing and Inspection Bureau collected \$1,065 in May.

It is reported from San Francisco that the Canadian Pacific is to resume running steamers between Vancouver and San Francisco.

The Pennsylvania Company is going to put on a number of dining cars west of Pittsburgh on both the Northwest and the Southwest systems.

The proposed North Carolina Car Service Association never began business, unanimous consent having been unattainable. The Richmond & Danville would not join, giving as its reasons the following: 1. The benefits to be derived will not justify the expense. 2. We cannot afford to enforce the rules on some parts of our line in the state under any circumstances. 3. The manager of the car service association issuing instructions to our agents and others in our employ is not in accordance with our views of discipline. 4. The fact that the car service rules apply to all cars is objectionable, as we cannot delegate to any one not an officer of this company authority to say how we shall use our own cars. 5. Car service associations have not been organized in several other states through which our line runs.

Senator Paddock, of Nebraska, has introduced in the Senate a bill providing for the inspection and storage of grain for interstate shipment. All railroad companies engaged in interstate commerce are required to construct elevators and storehouses for the storage of such grain along their lines. The President is authorized to appoint one chief inspector of grain in each state and territory. Any road that may fail or refuse to carry out the provisions of the act shall be liable for the damages sustained by reason of such refusal or failure. Mr. McMillan, of Michigan, has introduced in the Senate a bill to amend Section 22 of the Interstate commerce law so as to make it provide that nothing in the law shall prevent the transportation by any carrier of supplies and material for use by any other carrier in its business as such carrier, either free or at any rate of compensation that may be agreed upon.

Interstate Commerce Commission.

The Commission on May 31 decided the case of the Andrews Soap Co., of Cincinnati, against various railroads. The complainant makes toilet soap and ships it as such, and charges discrimination by the roads in classifying it as second class when it really is no better than soap put upon the market by certain other manufacturers as laundry soap, which goes as fourth class. The decision is, in substance, that the railroads may properly take the manufacturer's description, not being required to analyze the goods to ascertain whether they are in fact inferior to the description published by the maker.